

GILB'S MYTHODOLOGY

Architectural view of a soft system



WE need better communication tools with other professionals, with our clients and users, and even with ourselves; so that we can organise our own creative thinking in a more rigorous manner.

There is such a tool in the engineering field of cost-value analysis. It was brought into the computer field by TRW systems engineers about 1974, and was called the Requirements/Properties Matrix. Using this as a practical inspiration, I have made use of the method in a number of consulting situations as a tool for documenting and analysing a system design. Everybody who has come into contact with it seems to consider it to be a powerful and useful tool for specifying and quality-inspecting a system design, so I would like to share some of the details about it here.

The tool is called the Function/Attribute/Component Table. The "Attributes" are listed vertically on the left of a decision-table-like form. The attributes correspond to well-defined system goals such as cost, delivery date, ease of human use and learning, portability, reliability, etc. When necessary, for added detail and measurement precision, these goals can be "exploded" in a root-like manner, and sub-attributes may be created at will.

The "Functions" are simply any interesting set of functional viewpoints of the system. They may overlap, they may be motivated by the interests of any party. They may be hardware, software, documentation or organisational components of the proposed system. You may need to present several different viewpoints on separate F/A/C/T sheets, to satisfy various needs. A function may, just like the

attributes, be "exploded" for more detail. For example PRO-GRAMS could be detailed into specific programs. The system planning can take place top down by means of such explosions, until such a level of detail is reached that conventional low level specification techniques are appropriate (structured design, pseudocode etc). Functions are listed horizontally across the top of the table.

The COMPONENTS are design components. These are only referred to by a symbolic code in the intersections between Functions and Attributes. A code such as DBAUDIT might be used to refer to a design decision such as:

ALL MAGNETIC FILES SHALL BE FULLY AND AUTOMATICALLY AUDITABLE AS FAR AS POSSIBLE BY AN INDEPENDENT FILE AUDITING PROGRAM.

Components may, like attributes and functions, be exploded into more detailed design-decisions, at the appropriate time in the specification process. For example "DBAUDIT.PAR: The audit program shall be parameter driven for selective analysis as to input records, input fields, co-related files, depth and type of analysis and output reporting format and volume."

A design component is listed on a separate design specification sheet. High level design components are settled on before proceeding to detailed explosion. But you can explode early, any design component which might be particularly interesting to explore early.

A design component is noted in several of the Function/Attribute intersections. It is noted wherever it has a major impact. Any design component should impact at least one

PROGRAMMER NOTES

Demos, Compass: comparing the nets

ALTHOUGH both are capable of operating on networks of microprocessors and both are suitable for applications such as real-time plant control, there are few other similarities between the CEBB's Compass scheme (CW, July 20) and the NPL's Demos project (CW, June 29).

A key distinction is that Compass is a loosely coupled multi-processor system in which each processor is programmed separately.

Demos on the other hand is a tightly coupled system in which all the constituent processors in effect make up a single computer. It is programmed as one machine.

In a Compass system, application jobs are allocated to particular processors at an early stage in the design process, according to the function to be performed. Processors would typically be dispersed geographically, each in proximity to the plant equipment it is to control.

In a Demos system, the corresponding design step is the allocation of operating system tasks to particular processors. Processors would typically be localised geographically and tasks would be assigned between them according to the natural parallelism of the pro-

blem.

Thus each processor in a Compass system would in general hold a complete copy of the operating system, whereas each Demos processor is generally dedicated to a single operating system task.

These major architectural differences are accompanied by order of magnitude differences in the volume and rate of data exchange between processors.

Data exchange in Compass is essentially restricted to the passing of control parameters between related tasks. Invisible to the user, system mechanisms automatically update the local data pool for each process at regular intervals with relevant values extracted from other processors.

The frequency and speed of such exchanges is relatively slow, being governed by the needs of power station plant.

A specific benefit of loose coupling in Compass is a degree of system resilience. Should one processor fail, it will be feasible to revert to local manual control of that function.

Another significant feature is that programs can be modified in a running system. This capability is based on an interactive editor and compiler which can be run concurrently with

application programs on each processor.

Users of Compass will vary widely in their appreciation of computer systems. In addition to an end-user oriented language, the design includes specific protection mechanisms, discriminating — for example — between privileged and non-privileged users and permitting access to facilities accordingly.

Together with facilities for data protection, these mechanisms will make possible the construction of robust systems in which jobs cannot interfere with each others' resources.

The system will also include built-in error tracking to ensure that error conditions arising from data do not affect plant outputs adversely or give misleading results.

Specifically designed to be easily portable, Compass differs in this respect from Marconi's Locus 16 distributed processing system (CW, August 8, 1974) for which the company designed its own 16-bit hardware modules under the Alp-1 project.

The new development, also in Coral, otherwise bears a close resemblance to the Marconi system which, widely regarded as ahead of its time, has been marketed only for air control applications.

Concurrency requirements rule out Coral for Demos

THE choice of Concurrent Pascal for the NPL's Demos system further emphasises the significant difference from Compass, which is to be written entirely in Coral 66.

Concurrency requirements ruled out the use of Coral as the principal implementation language for Demos, according to a spokesman for the Joint NPL-SELcon team working on the project.

Although Coral was attractive from the point of view of standards and availability, the absence of constructions for handling parallelism was a major deficiency, he said.

The language was also less strongly typed than Pascal, making it more difficult to write reliable programs, and it suffered from its relative age.

The team was, in effect, left with the choice between Concurrent Pascal and Modula as a system implementation language. Details of the enhancement of Modula for this type of application were given by Professor Wirth at York University two weeks ago (Software File, July 20).

Based on Wirth's Pascal, and incorporating work on the notion of monitors by Professor Tony Hoare at Oxford, Concurrent Pascal was developed by Brinch Hansen at Caltech in the US. He is still the only Concurrent Pascal compiler in existence.

Originally developed for the PDP-11, the compiler is used in the Demos project to generate intermediate code, which is then interpreted at execution time by the kernel resident in each processor, see Figure 1.

In addition to the interpreter the kernel contains low-level communications routines and device drivers, which could not be written in Pascal. The kernel itself is written in Coral, for which the Argus 700R, the project's current hardware, is specifically designed.

Above the kernel, which is

distributed in each processor, software is specific to the processor on which it is running. The level immediately above, which is referred to as the application support environment, comprises high-level operating system tasks, written in Concurrent Pascal.

This includes routines for scheduling and job processing, disc file access, database management, and terminal control.

The allocation of these tasks to particular processors is performed as part of the system generation (Sysgen). Processes may, where appropriate, be multiplexed on a single processor, by making more than one process resident.

Application software	Sequential Pascal
Application support environment	Concurrent Pascal
Kernel (executive)	Coral
Computing hardware	
Interconnections	

Figure 1: Organisation of a Demos processor.

The allocation of operating system tasks to processors is essentially static.

At the highest level, application software, routines are assigned dynamically to appropriate processors by the system software. Demos currently supports programs written in sequential Pascal, but may later be extended to support application programs in Coral and Fortran.

Interconnections between the processors, electrically a single ring highway, are logically a bus. Based on executive-level block transfer, messages are passed using a three-way handshake protocol.

Inter-process communication is programmed as a simple procedure call, which is converted to an inter-processor call by the

Sysgen procedure.

One possible future development is to implement communications management as a scatter/gather mechanism built-in to the hardware. This approach would entail splitting each processor into a pair of processors: one a general purpose machine, the other a special purpose microcomputer.

If adopted, this architecture would implement all kernel functions, including the interpreter, in hardware.

Demos designers note that the system is particularly intended for applications which divide naturally into co-operating sequential processes. This would include such areas as plant and process control, database pro-

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Figure 1: Organisation of a Demos processor.

cessing, word processing, communications, and interactive terminal services.

Specific advantages of Demos include the fact that it is easy to expand in the field, that expansion can be smooth, with no discontinuities in the price/performance curve and that the system is easily adaptable to different microprocessors.

Another notable feature is high-reliability. Although users will not be able to reconfigure a system dynamically should one processor fail, it is intended that the system should be rapidly reloadable with an alternative software fit.

At system generation, alternative versions will be created which will increase the number of processes supported on each processor.

SOFTWARE FILE

First Euro order for Trax

WHAT is believed to be the first European order for Digital Equipment's newly released Trax TP monitor (Software File, June 22) has been placed by Gamma Associates, Gamma's client, Clive Discount, a leading City discount house, changed an existing order

with Gamma to reap the benefits of the new software. Gamma said that the main advantages offered by Trax are speed and economy of applications development, automatic error recovery features and inherent application documentation.

Decision table-based language for PDP, IBM

A HIGH-LEVEL language system, based on decision table techniques and available on Digital Equipment PDP-11 and IBM System 3 equipment, has been launched by a specialist UK software company.

RPL, Replacement Programming Language, is a super-set of the popular Filetab and FTL6 packages now marketed by the National Computing Centre.

Written by the chief designer of these products, Tom Barnard, it will be sold and supported by Filetab Support Services, a company which previously concentrated on Filetab and FTL6 consultancy services.

Already running at some twelve test sites, the PDP-11 version, designated RPL(11M), runs under all major operating systems, including RT11, RSX, RSTS/E, COS350, and COS500. It will also run on micro systems based on the LSI/11, and on PDP-20 systems.

Due to be formally released in about six months, the IBM version will be supported on System 32 and System 34 machines in addition to the System 3.

A fully compiled language, RPL(11M) offers major advantages both in speed of execution and speed of program development over its chief DEC rivals, Basic-Plus and Basic-Plus 2.

Fully compatible with PDP-11 file formats, the most basic use of RPL is a report generator from existing Cobol or Basic application files. Inbuilt multi-level control breaks, automatic totalling and multiline tabulation are among the facilities provided.

The language is also appli-

cable to the development of complex application systems. In addition to instructions for character string handling, indirect addressing and table look-up, it supports a variety of disc file access methods, including chained record, hierarchical and indexed sequential organisation.

At Airfix Industries, an early site, RPL's variable length chained file capability enabled the development of a complete bill of materials processor.

Not restricted to batch operation, the system offers facilities for screen handling and data input validation for online applications. It accesses standard DEC operating system mechanisms for locking out concurrent file update attempts.

An interesting feature of the package is that it includes its own virtual storage run time system. Running under the main operating system, and including the RPL language compiler, this software is responsible for paging user programs in and out of memory and effectively eliminates restrictions on program size.

The monitor occupies an 8K memory partition on the PDP-11 and requires 96 disc blocks.

RPL is input at a terminal using free format statements. A direct input option allows for online syntax checking of a program; alternatively program statements may be entered to an off-line file for compilation later.

Programs typically begin with a series of dictionary statements, mapping data names on to file record layouts. A central source code library and Copy statement are provided to facilitate the incorporation of

Interface for Shadow, Librarian from CAP

AN interface between ADP's Librarian Online and Altergo's Shadow TP monitor has been developed by Computer Program Products, the software products arm of CAP-CPP. CPP has also announced the latest release of Librarian, which features a comprehensive archiving capability.

The new interface means that users of the source program retrieval and maintenance

system can work online under Shadow.

Librarian already offered interfaces to Cics, Task Master, and Dataconn.

A particular benefit of the new Librarian archiving facility, called Archie, is what CPP describes as "total retention." This means that all changes made to a source program at any time during its life can be permanently retained with the program.

The system provides for the retention of up to 255 versions of a program, any of which is instantly retrievable. Also retained is information regarding the type, date, time, and level number of each update.

All of this information is kept within the source program itself, which is subject to the Librarian's compression algorithm. The eventual size of a program is determined by the number of times it is updated and the number of statements added during its life.

Archie operates on both disc and tape master files and allows programs to be switched from archive control to normal processing if required.

CPP notes that the new feature allows the elimination of all manual source program maintenance activity. It also provides a full program modification audit trail, including the physical data records corresponding to each change.

Manchester office

A BRANCH office in Manchester is to be opened by Systems Designers Ltd, the Surrey-based computer systems consultancy. The new base — at 40-42 Washway Road, Sale, Cheshire — will complement existing SDL activities in the North-east, notably a recent £827,000 contract with British Steel at Redcar.

Turnkey system

A COMPLETE turnkey accounting system, worth £130,000, is to be developed by Haven (Computer Services) Ltd for the National Supply Corp of Libya (Nasco). The hardware is a 64K CMC Realty system in the Royale version, incorporating the new firmware and Release 3.0 of the operating system.

DEC signs up Nastran

THE structural analysis package, Nastran, originally developed under the direction of Nasco, is to be marketed as part of its software product range by Digital Equipment Corp. DEC has also signed a marketing contract for Sap VI.

Both packages are now available on DECsystem-10 computers and are likely to be converted to run on the new Vax 11/780.

Sap VI, the latest version of a structural analysis package known for its simplified user interface, was developed and is supported by the University of Southern California. Nastran is supported and marketed by MacNeal-Schwendler.

The announcement follows Atkins' implementation of Aes for the DECsystem 2020. Aes also runs on the DECsystem-10 and may be adapted for Vax (Software File, May 11).

DEC's Engineering Systems Group has also announced new word processing capabilities for the IAS, Vax/VMS, and Tops-10/20 operating systems. The new facilities are functionally equivalent to the Document Exchange utilities already available for RSX11M and RSTS/E.

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Developed in the US by Goal Systems, FTL achieves its effect by reducing contention on the system residence volume (SYSRES) and by freeing transient areas more quickly. When any transient is to be fetched into either the logical transient area or CRT transient area, FTL will determine whether the phase is resident in storage. If it is, it can be moved directly to the transient area, eliminating the need to read the core image library.

Any number of B-transients, including DOC or CRT transients, can be supported by the system and can be placed either in real or virtual memory. The system requires a minimum of one 2K page of real storage in which to hold execution code and a directory of resident phases.

To facilitate tuning, the software provides statistics of transient loading activity, one detailing references to resident phases, and the other listing the most frequently referenced non-resident phases.

Westinghouse estimates that FTL will normally save between 30 and 120 milliseconds for each transient load. Thus on a typical load estimated at 5,000 loads per hour, the package can save anything from two to 10 minutes per hour.

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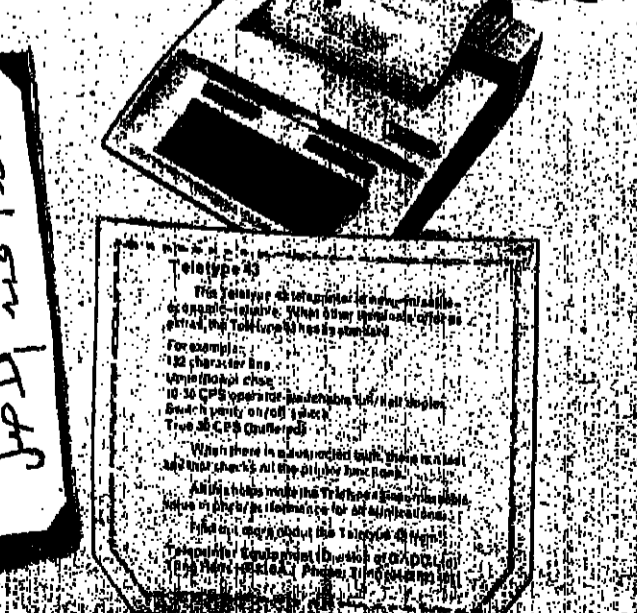
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The growing success of the PDA fixed-asset accounting system (Software File, April 20) has been marked by its installation by the Data Services Division of Control Data. The package is available to network users as a batch, remote batch, or online interactive service.

The developer of PDA, Uniflex Computer Services, has moved to new offices at 1 Church Street, Stourbridge, West Midlands, DY8 1LT. Tel: Stourbridge 78381.

AN interactive financial modelling package designed and developed in Sweden is being marketed by ICL Datacell for ICL System 3 equipment. The software, Prosper Ten, provides similar facilities to the existing 1900 and 2803/4 versions of Prosper, though it is not compatible with these products.

A BRANCH office in Swindon has been opened by the Birmingham-based firm, Gould Computer Systems, at 169 Victoria Road, Swindon, Wilts. Tel: 0793 45701.

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PEOPLE

Angus Ogilvy joins GEC

AMONG the appointments made to the UK General Electric Company board recently is that of Angus Ogilvy, who becomes a non-executive director. Robert Clayton and David Powell become executive directors.

Clayton, GEC's top micro man, has been with the company since 1937. He has been technical director since 1968, and is also a director of GEC Management. His career has included the managing directorship of GEC Electronics, 1963-6, and of GEC Research, 1966-68.

Michael Pye has become managing director of Sinclair Radionics. He was technical director of the company from 1973-76, then moved to Gillette in Cambridge, Massachusetts to become director of electronic development, responsible for electronic appliances, clocks and watches and smoke detectors.

John Duffy, corporate vice-president of Fairchild in the US, has become general manager of the discrete products group, and is succeeded as head of world-wide semiconductor marketing by division vice-president Andrew Prosser.

Frank Ferret, formerly technical manager with the Communications Centre Ltd, has become field sales engineer with Microdata.

He was chairman of the Electrical Engineers' Association 1966-7, and of the IEE Electronics Division, 1968-9, and president of the IEE from 1975-6. He has served on various government and industry committees for research in electronics.

Powell has been assistant general manager of GEC Power Engineering and assistant managing director of GEC Telecommunications. He became director of industrial planning in 1969 and managing director of GEC Diesels in 1971.

Michel Guy becomes marketing manager for Hughes Microelectronics. He will be responsible throughout Europe for the products of the Hughes divisions at Weybridge and Glenrothes, and will head the Brussels and Paris offices. His most recent job was as European military and aerospace marketing manager with National Semiconductor, but most recently he has been attending INSEAD, the European business school at Fontainebleau, where he qualified as Master in Business Administration.

Robin Hamilton-Jones, previously a senior systems analyst with Hanson Consolidated Copper Mines in Zambia, has become a systems engineer with Cincom Systems International in the UK.

Ian Fleming has become manager of the Northern software centre of Philips Data Systems, in Manchester. He was formerly a systems officer with the Co-operative Bank.

IDPM committee

AT the AGM of the Institute of Data Processing Management, West of London to Oxford branch, the chairman, J. C. Nunn, was elected for another year.

A further two committee members — Derek Hurrell and Colin Bendall — were elected; otherwise the membership of the committee remains the same as last year.

Peter McPoland has joined Jenson Computer Systems as senior programmer. Previously he was a programmer with Unigate and Rolls Royce. David Haines joins Jenson as a trainee programmer.

Stuart Pope, formerly a marketing executive with Computer Systems and Programming, has joined Strand Computer Systems in a similar capacity.

Bert Fensome of NCR has been appointed district manager of the commerce and industry division. Previously he was vocational services manager with responsibility for systems and programs services and for the marketing aspects of commercial application software.

George Tannous, previously marketing manager for the Middle East and Africa with Memorex in Brussels, has joined Ite International as director with overall responsibility for the management of the company's activities in the Middle East, Africa and India.

John Clifford, Joe Hazelwood and Malcolm Webb, of computer stationary printers Incubator, have been appointed to the board. Clifford, who was formerly works manager, becomes works director; sales and commercial manager Hazelwood becomes sales director; and Webb, previously financial manager, becomes financial director.

THE Computer Tournament for schools held recently by the Industrial Computing Bureau (GMS Computing as part of Sheffield Science and Technology Fair was won by the team from the Henry Farnham School, Dronfield.

The teams in the final had to find the best routing schedule for transporting containers from Sheffield to York. The problems were programmed in Basic by GMS, and the contestants used the IBM Call System to help them.

In our picture above Martin Chetwin, GMS managing director, presents the GMS Trophy to the winners, (left to right) Mark Ashton, Peter Ashforth, Ian Allison, Craig Turner.

Bob Monte, until recently vice-president of field operations with Ite International, has been promoted to executive vice-president of the field engineering division.

Operational Data Security Corp. City University, London EC1. Register August 18: 01-253 4396, ext 347.

AUGUST 21-24
Cybernetics and systems fourth international congress. World Organisation of General Systems and Cybernetics. Amsterdam. Details Dr J. Rose, College of Technology, Blackburn, tel: 0254 6321.

AUGUST 22-28
Conference on parallel processing.



DIARY

AUGUST 6-8

Computers, communications and technology transfer. Jerusalem conference on Information Technology. Information Processing Association of Israel/IEEE. Jerusalem.

AUGUST 9

Boat Trip. Association of Independent Computer Specialists. From Tower Pier, London. 19.00. Tickets £3.00 from AICS. Tel: 01-437 0878.

AUGUST 21-24
Operational Data Security workshop. Operational Data Security Corp. City University, London EC1. Register August 18: 01-253 4396, ext 347.

AUGUST 21-28
Cybernetics and systems fourth international congress. World Organisation of General Systems and Cybernetics. Amsterdam. Details Dr J. Rose, College of Technology, Blackburn, tel: 0254 6321.

AUGUST 22-28
Conference on parallel processing.

IEEE Computer Society/Wayne State University. Bellare, Michigan, USA.

AUGUST 23
Meeting. VM UK and Ireland User Group. Maidenhead. Details from Ian Stinson on 01-580 5111, ext 2700.

AUGUST 23-25

Siggraph 78, fifth conference on computer graphics and interactive techniques. Association for Computing Machinery. Atlanta, Georgia, USA.

AUGUST 28-SEPTEMBER 1

Eight Australian Computer Conference. Australian Computer Society. Canberra.

AUGUST 29

Jackson design technique, management tutorial. Marcus Bromberg Dept of Computer Science, University of Strathclyde, Glasgow, G3. Details from the Continuing Education Office at the University, tel: 041 532 4400, ext 218.

'Quicker to get a loan from our local bank than from ICFC or DoI'

IN a hard-hitting attack on two major sources of finance, the Department of Industry and the Industrial and Commercial Finance Corp, John Neale, managing director of the rapidly expanding terminal and microcomputer manufacturer, Transdata, has described the response of these organisations to requests for working capital as dismal.

Speaking at a lunch to celebrate Transdata having passed the £1 million turnover milestone, in its financial year ended June 30, Neale said that it was easier and quicker for Transdata to get a loan from its local bank than from the ICFC or the Department of Industry.

Transdata, which is now well established and highly profitable, can increase its overdraft at its local bank by 50% with no more than a week's notice, according to Neale. In contrast, if Transdata tried to get a loan from the ICFC it would typically take three months to the go ahead and strings would probably be attached — like ICFC wanting a share in the company.

Neale said that the DoI was really interested only in lending money for product development and not in providing working capital for expanding production and marketing. The DoI usually



John Neale

took nine or 10 months to provide the cash even if it agreed to do so. Transdata builds a range of thermal matrix printer terminals, of which there are now 3,000 installed in the UK and on the Continent, and its other main product is the CX400 microcomputer system which comes with a floppy disc storage and can be programmed in Basic. The CX400 is sold by Transdata on an OEM basis.

Neale said that Transdata was aiming for a £2 million turnover in its current financial year.

Name change for Info show

THE exhibition and conference that made its debut in April as Info 78 (CW, April 13), is to be repeated next year from April 3/8 at the same venue, the West Centre Hotel in London. It will be called Info 79 — the Business Computing, Word Processing and Information Handling Exhibition and Conference.

This year's show was called the Information Handling and Management Exhibition and

Conference, and the organiser, BED Exhibitions of Wallington, Surrey, says that many prospective visitors might have identified it with multi-million pound management information systems and decided that it was above their heads. BED believes that more people would have visited the show had they realised that the emphasis was very much on the practical systems applicable to smaller businesses.

New company's commercial system for £10,400

A COMMERCIAL hardware/software package called System 800 which will cost as little as £10,400, including a 16-bit processor and disc basic operating software, is to be launched by a new company, System 800 Ltd of Newcastle-upon-Tyne.

The processor and memory for System 800 are built by Electronic Memories and Magnetics in the US and have been supplied by EM&M to customers there since last October.

System 800 Ltd in the UK has developed a disc Basic operating system for the EM&M processor which can handle multi-tasking by up to four terminals, but not multi-programming. The Newcastle firm is now

producing a range of applications packages to handle jobs like payroll, purchase, sales, stock, insurance and HP/credit.

System 800 Ltd says that it plans to sell the EM&M processor to systems houses and specialists in the UK on an OEM basis as well as selling System 800 to commercial end users. Under its agreement with EM&M, System 800 Ltd has the rights to manufacture the processor in the UK if EM&M stops building it.

For £10,400 the System 800 purchaser will get 64K words of memory, one VDU, a 60 cps printer and a five Megabyte cartridge disc drive, as well as the processor and operating software. The applications pack-

ages will cost £500 each on top of this. The biggest System 800 configuration will still have a 64K word memory, but will have 40 Megabytes on disc, a 300 lpm printer and eight VDUs.

System 800 Ltd is a subsidiary of Cattle Holdings, a Hull-based group with a turnover of nearly £40 million a year and interests in consumer finance and insurance. Cattle's owns one other computer firm, Hadrian Computer Services which, like System 800, is located at Newcastle. Hadrian runs a bureau service on an ICL 1903T and writes applications software for machines like the ICL 2903 and the IBM System 3 and 32.

Brokers strongly back buying of ICL shares

By Tim Palmer

BACKED with evidence that ICL is better placed to compete with IBM than most of the US mainframe manufacturers, London stockbrokers Laurie Millbank have come out with a strong recommendation to buy ICL shares.

"We believe that ICL has the right combination of products, technology, financial strength and management to continue growing at an above average rate, and consider that despite the competition from US companies, ICL has a bright future in data processing," say the brokers at the conclusion of the 32-page in-depth examination of the company.

"The market has taken a very cautious view of ICL for several years, which we feel does not adequately reflect either ICL's recent successes or future prospects. ICL has grown faster and has been far more successful in innovating than its major US

competitors, but it is on a lower rating than any of these companies while having a higher yield.

"Furthermore, compared to a vast majority of UK industrial companies, ICL's record is very impressive, yet the shares also stand at a discount of 35% to the market. We consider that this anomaly will be rectified soon and that at around these levels, ICL represents outstanding value."

On ICL's ability to compete against IBM, the report notes that ICL's foreign turnover has risen from £60 million in 1973 to £212 million last year, giving it second place to IBM in the non-US world market. It also gives a table purporting to show that last year, ICL's sales worldwide grew faster, at 45.2% than any of the major US manufacturers apart from Digital Equipment, which had 43.8% growth. However, it does not point out

that ICL's growth was dramatically increased by the inclusion for the first time of Singer sales in its total. Even so, the comparison is noteworthy in the Honeywell, number three in the growth stakes, improved only 16%.

The report is enthusiastic about ICL's technical performance, saying that the 2900 series hardware exhibits "exceptional versatility and power" and that the software utilises "very advanced design concepts."

It also believes that while the 2900 design concepts are valid throughout the 1980s, the US manufacturers will have to undertake very substantial product developments over the next few years—and to substantiate its claim that ICL is strong in basic research, points to the Distributed Array Processor, which it believes will be a significant product in the future.

A further major source of financial strength identified by the report is that "ICL's return on capital employed is higher than that of any of the major computer manufacturers except IBM."

The report is bullish on ICL's advanced architecture in the 2900 series.

"The majority of 2900s are still in their first version," it says. "Against this, IBM and the US majors have computer architecture dating from the 60s, which has already been enhanced so much that there is little potential for further improvements. Hence, while ICL can probably double the performance of the 2900 range by enhancements, to get significant improvements, the competitors will need to introduce new products." This analysis ignores the NCR 800 series, particularly the Critereons, which are rather newer than the 2900.

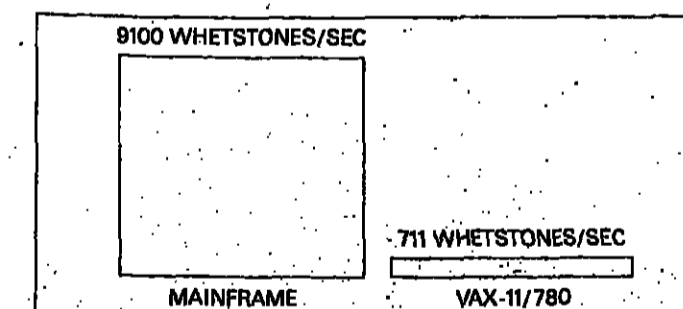
Digital's VAX-11/780 takes on the world's leading scientific mainframe.



And wins two rounds out of three.

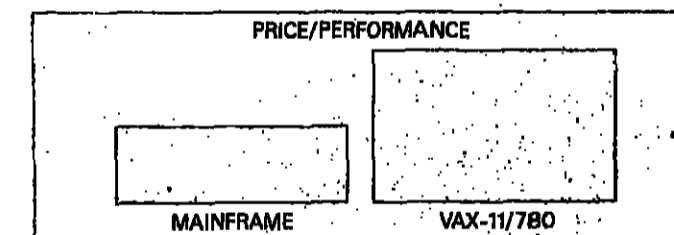
Round one to the 60 bit mainframe:

Speed. The mainframe is still the speed champion with 9100 Whetstones per second.



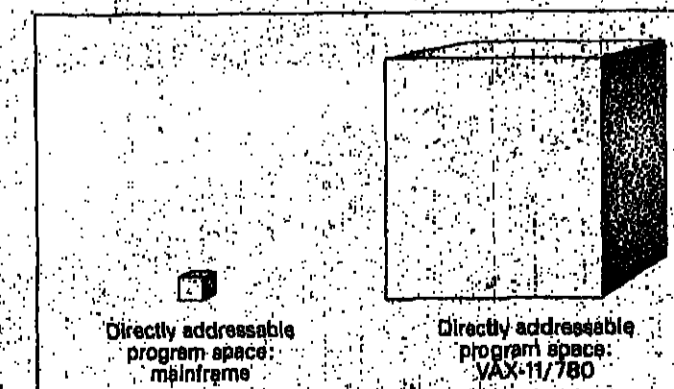
Round two to VAX: Price/Performance.

The 32 bit VAX is the world's fastest mini. A VAX system runs 711 double precision Whetstones. That's one twelfth the speed — at one twenty-fifth the cost. A dozen VAX systems could equal the throughput of the mainframe system — and you'd still save literally millions of dollars.



Round three to VAX: Program size.

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Series to help managers

A SERIES of talks on audio cassettes to help managers keep up-to-date with developments in computing has been introduced by the National Computing Centre. Called Talking Points, the tapes are accompanied by illustrations, diagrams, and self-checking questions, and each session takes about 45 minutes.

Topics of the first tape will be: introducing microcomputers, computer output to microfilm, database organisation, and computer security. Six topics cost £16.44.

Penril modem

FIRST of a series of modems to be announced in the UK this year by Radfon Telecommunications Division is the 2400 LSI, made by Penril Corp in the US. The 2400 LSI conforms to CCITT V26 and V26 bis, and has Post Office approval. The modem includes a test pattern generator and analogue and digital lock-back checks. It sells for £162.

CAD symposium

A SYMPOSIUM on Computer Aided Design for digital circuits and systems, sponsored by the REC Commission, will be held in Brussels from November 27-29, 1978. Results of a study carried out on behalf of the Community by Saget will be presented and speakers from the US, Japan and Europe will give papers. Cost will be \$170.

DG profits up 37%

IN the 12 weeks to June 3, 1978, Data General made a pre-tax profit of \$17.9 million, up 37% on the same period last year.

Tailored to fit

UNDER a contract worth well over £300,000, Anker Data Systems is supplying Burtons, the tailoring group, with 441 electronic cash registers for Burtons shops all over the UK. The registers are ADS Omron 573 units.

Banking on a profit

NEW YORK Times Information Bank, the online retrieval service for news and current affairs (CW, March 2) lost \$900,000 in operations last year. This is an improvement over the 1976 loss of \$1,600,000. The paper says it is confident that the bank will "ultimately" turn in a profit.

\$100,000 contracts

AIR-conditioning systems supplier, Wright Air Conditioning (Scotland), has secured two contracts worth £100,000. The first is with Aberdeen District Council and the other with A. R. Findlay, domestic hardware wholesalers of Glasgow.

Prestel service for young job-hunters



Prestel comes to the aid of student job-hunters.

THE first commercial application of Prestel has been launched: an online job advertising service for graduate recruitment. New Opportunity Press, which runs the service and calls it Careerdata, has already installed 14 viewdata terminals in university and polytechnic careers offices, for students to use in looking for job openings.

The service will be completely free to the job-hunters, being paid for by the firms whose jobs are advertised. Only the charge for the telephone call will have to be paid for by the university; the terminal is provided free, together with a user number that allows access only to Careerdata, excluding other Prestel services.

The viewdata terminal is a modified television set connected to a modem. The user calls up the Post Office's online computer at Martlesham Heath, where of the many thousands of pages of text available, 3,000 have been allocated to Careerdata.

Pages are selected with a numeric keypad, using a "tree" indexing system; each page shows a list of the pages that can be selected next, as one goes down the tree to get more detail. Each page can hold 22 lines of copy, 39 characters wide.

Jobs on Careerdata can be accessed by three indexes: employer name, type of work, and application. Each of these has an alphabetical index that the user works his way through. An employer is allocated as many pages as it chooses to pay for, and can arrange these pages in any way it likes, with jobs grouped geographically, for instance, or by type of work.

There is a standing charge of £150 a year, plus £20 for each frame entered, and 4p every time a frame is accessed. This last charge is the Post Office's, and means that if 1,000 students look at five frames each over the course of a year, the subsequent charge will be £25.

The system has the distinct advantage of immediacy. In that vacancies can be online within hours of arising, and also can be removed the moment a job is

filled. The entry of the text and the associated management is done by the Careerdata staff.

There are only 16 ports on the Prestel system at present, so usage is limited. A new computer in London is being added to the system in August, when the number of ports will go up to 200. Careerdata will then be in a position to provide terminals to other universities, and eventually expand the system to cover non-graduate jobs.

Collecting weather data

TWO Digital Equipment PDP 11/05s are being used by EMI Electronics to collect, store and process oceanographic and meteorological data related to them by the UK National Data Buoy, DB1, which is now at station in the South Western Approaches, about 150 miles from Lands End.

Developed by the Seatek Group of Companies, the buoy is continuously collecting the data for the benefit of the offshore oil and gas industry, and transmits the information to the land via a high-integrity telemetry link. Data will also be made available to the UK Meteorological Office to assist in the completion of synoptic weather forecasts for the UK.

US boost for X25

From front page

ones for an I/O channel-level interface, an accompanying power-control interface and, for the first time, a proposed channel-level operational specification for magnetic tape.

This package, which the NBS hopes will be difficult to tear apart, is aimed at saving as much as \$55 million over the next five years in "trimming the cost of buying new computer peripheral equipment."

The NBS move confirms the prediction of a leading US senator, Fritz Hollings, who has said that the NBS is the focal point of the Government's five year plan to "achieve much closer coordination between government procurement and the meeting of acceptable standards."

Hawker Siddeley £135,000 order

THREE 80K Burroughs B814 computer systems worth £135,000 have been ordered by Hawker Siddeley Power Engineering, one for each of its main UK offices.

Level 64 picked for ease of upgrading

INSURANCE company Hearts of Oak Benefit of Leicester has replaced its six-year-old Honeywell 1015 with a medium-scale Level 64/30 mainframe, citing ease of conversion and field upgradability in this future as reasons for its choice.

Name change

SUNNYVALE-BASED Ampcor Inc., a subsidiary of Datacube Corp of San Antonio, Texas, is to be renamed Datacube Corporation Products Division.

MICRO NEWS

Ferranti may enter high-end market

FIRST samples of the new Ferranti multiply and divide circuit for its F100-L 16-bit microprocessor are expected to be available by the end of this year, and the development could mark the start of a significant expansion programme for the company in the high end of the market.

For the device, in essence a 16-bit slice processor, will be a fast device, with a total elapsed time between sensing an instruction and completing the task in the range of 7-13 microseconds. Its capabilities will include adding two 16-bit numbers to produce a 32-bit number, and dividing a 32-bit number to produce a 16-bit result.

In its current form the device is not cascadable, ie it will not be possible to contact two or more together to produce longer word-length processors in the manner of bit slice devices like the AMD 2900 series.

Ferranti, however, is considering such a development for the future. It probably would be

broadly compatible with 2900 type processors, and by using the company's uncommitted logic array technology, it feels it will be able to develop rapidly the necessary support circuitry.

An obvious early market for such a move undoubtedly would be the company's own Argus range of minicomputers, which already utilise the AMD part.

There is also the possibility that the basis of the multiply/divide circuit will be incorporated in a revised version of the F100-L itself. The current processor uses a 16-bit serial function unit. The decision to use this approach was taken by the company as a trade-off between its smaller size, but slower operating speed, which is largely compensated by the fact that the unit uses fast bipolar technology.

Such a development would produce a 16-bit parallel version of the processor that could offer a doubling of processing throughput without any technological development.

Grand Met sets up applications workshop

THE diversity of potential applications for microsystems within the Grand Metropolitan group of companies has prompted it to set up a micro "workshop" to develop them.

Headed by Ian Fitzpatrick, the workshop comprises the five man Planning and Research Group, part of the Technical Division of Grand Metropolitan Information Processing. It is based at GRIP's Uxbridge bureau, where it has access to an ICL AS/5 and an ICL 1900 for systems development work. The ICL machine is to be replaced in October by an IBM 3031.

Though, in the future, it may consider outside contracts, the group's current activities are solely concerned with applications within Grand Met. These revolve around producing software implementations that run on readily available microcomputer hardware, the current

favourite system being the South West Tech 6800. There are no plans for the group to enter the field of hardware design as well.

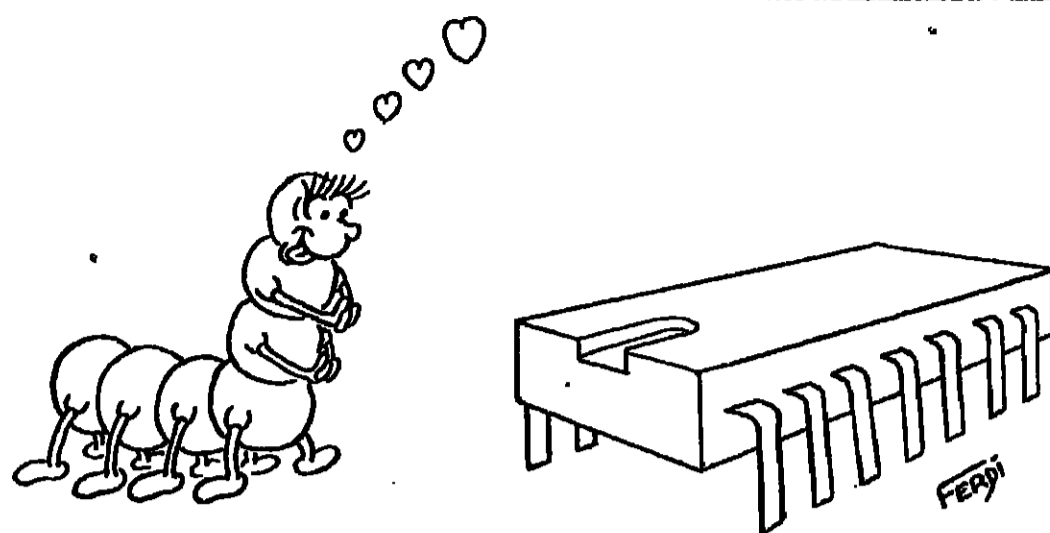
The work currently being carried out by the group includes the development of a system to control the ordering and stock of milk delivery roundmen for a dairy products company within the group. Based on an SWTPC system with two mini floppy drives, it would be installed in the regional depots of the company.

At an early stage of evaluation is an order entry system that would be involved in a company exporting alcoholic drinks, while another development the group is working on is for using micros for data collection purposes for a stock-recording linear program that is already in operation.

Low power standby ROM

A NEW 64K bit read only memory has been introduced by Mostek of France, a low power standby mode of operation which is said to increase both device and system reliability.

Known as the MK 38000, the memory requires only a single five volt power supply. It is organised as 8K by 8 bits and offers a maximum access time of 250 nanoseconds.



GECS to stay out of any US deal

WHICHEVER US semiconductor manufacturer the GEC group finally deals with in its efforts to establish a joint venture operation, the move will not affect the position of GEC Semiconductors as the company's lead house for custom-designed LSI circuits.

This was made clear last week by Chris Turner, director and general manager of the company. There are no plans for GEC to enter the standard product market, where it accepts the fact that it would be impossible for it to compete. But the GEC group was obviously interested in the opportunities, and was therefore looking at the possibility of participation with an established company.

Although there is no formal corporate policy decision by GEC, Turner implied that any joint venture operation would almost certainly have a UK manufacturing operation. This, according to Turner, was because it would be unlikely for GEC to want to invest in US technology and leave that technology solely in the US.

Although the company is not short of financial resources, starting a "greenfield" operation to compete in more than one product area for the world standards market would take a great deal of money over a considerable period of time.

The one company that GEC has been known to be talking to, Fairchild Semiconductor, has no existing UK production facility or any European facility either. The prospect of collaboration with GEC is therefore obviously tempting, in that it might offer Fairchild the chance to establish a European base.

But, considering the costs involved — there would be little change out of £100 million in all probability — GEC's reticence in commenting on just which companies it is talking to inevitably opens the way for speculation on other possible candidates.

These will obviously include the US manufacturers with UK operations, such as Motorola, National Semiconductor, Texas Instruments and General Instrument Microelectronics, all of which are well entrenched in the mass market. The first three would possibly be too big for even GEC to swallow easily. GIM, however, is smaller, and complements GEC in several areas in that it has considerable expertise in custom design work and is a competitor in the telecommunications market for such devices as push-button telephone dialler chips.

A spokesman for GIM however, has categorically denied any talks having taken place with GEC.

GEC itself is now operating

Computer retailing shop for Liverpool

THE computer retailing trend is gathering pace, with the news that another shop is to be opened shortly, this time in Liverpool.

Opening at the end of this month, at 25 Brunswick Street, Liverpool, Microdigital is currently stocking up a wide range of products that fall into three main categories: dedicated task systems, general purpose microcomputers and support items.

In the first category will be such items as micro-based door bell systems and microcomputer games systems. In the second, Microdigital will be selling kits from Science of Cambridge and Lynx, handling the Mk 14 and Nascom 1 respectively. On the systems side it will have Apple II's the Casu general purpose system, and the Star interactive booking system, running on Mael 2000s.

Support items will include packaged software from a variety of sources, including programs produced in-house, literature and assembly equipment.

The company is being run by Bruce Everiss and his brother Alan, whose main task will be to build all the kit demonstrator models. This way they hope to face and overcome the common assembly problems.

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The shape of galaxies

SCIENTISTS at IBM's Watson Research Centre in Yorktown Heights, New York, have been using a 370/168 to test a new theory about the formation of spiral galaxies. Computer simulations have been run to find whether the shape of galaxies is brought about by the redistribution of matter in large numbers of superimposed explosions and as our photograph shows, the patterns predicted by the simulations match up remarkably well with actual galaxies.

Add-on board for Pet

A SINGLE add-on board may soon be available from Commodore for its Pet personal computer that extends the memory capacity up to 40K bytes. This provides 31K bytes of user memory space and, with memory partitioning, allows an other language compiler or interpreter to be run in addition to the standard Basic interpreter in the machine.

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How India is keeping abreast in DP services

THE best known and most professionally-run computer services company in India must be Tata Consultancy Services of Bombay.

Part of the giant \$2,000 million a year Tata conglomerate, which makes everything from soap to trucks, TCS has a close working association with Burroughs, and has formed a joint manufacturing and software company, Tata Burroughs, in which each has a 50% holding.

TCS is run by Faqir Kohli, a soft-spoken, humorous man from the North-West Frontier, who exhibits all the best characteristics of the sturdy independent tribal people from that mountainous area.

TCS employs 250 computer professionals, all with ex-

perience in systems design, and its turnover has grown from \$350,000 in 1968 to \$5 million in 1977. \$1.6 million of it earned abroad.

Equipped with a Burroughs B8700 with 512K-bytes of store, shortly to be upgraded to 1.8 Megabytes, a B1728 with 192K-bytes, an ICL 1903 and two IBM 1401s, it is not surprising that TCS has abundant experience of conversion. It claims that 100 man-years of effort has gone into rewriting ICL, IBM and Univac programs for the Burroughs line.

TCS is also heavily involved in the Europeanisation of US business packages for the Burroughs B80 small business computer. Inventory, receivables, payables and general ledger packages are

all being adapted to European requirements, and a TCS team is doing the work in the UK.

TCS insists that it is in no way responsible for the lateness of B80 software, and indeed the work done by the company is very highly spoken of within Burroughs.

Burroughs has brought in TCS as subcontractors for many overseas projects, including development of a hospital real time information system and a banking information system in the US, conversion of 1,000 370/145 Cobol programs to B8700 for the City of Detroit, Burroughs' home in Michigan, and an IBM to Burroughs conversion for the Auckland Savings Bank in New Zealand.

A major conversion job was undertaken for the European Container Terminis in Rotterdam, where it was necessary to convert 200 programs written in Univac 9400 assembly language into Cobol to run on a B3700.

The project was managed in Bombay, took five man-years of effort, and most of the work was done on a B4771 installed in Delhi.

Some system software, mainly Cobol and Algol preprocessors has also been written, but the company's forte is clearly in cost-effective conversion.

The rates charged for a senior man are \$24,000 to \$30,000 a year overseas, with travelling and living costs extra, and \$15,000 to \$18,000 a year in India, including computer time.

The B6700 will greatly expand the capability within TCS, but the company is not yet in a position to use the machine to anything like its full extent. A few terminals are attached, but the overwhelming workload is still batch. Improvements in the communication facilities in Bombay, the addition of more terminals and the addition of the extra memory should enable TCS to make much more effective use of the machine.

The association with Tata and the agreement to manufacture sub-assemblies for the B80 for export have led the government to look favourably on Burroughs, and since 1973, the company has acquired a strong nucleus of machines in India. As well as the machines at Tata, there is a B6738 at the Calcutta Regional Computing Centre, a B1728 at the State Bank of India, and a B4771 at the Agricultural Institute.

The legendary IBM 1401 at Dunlop (CW, June 8, 1974) is finally to be pensioned off and replaced with a B6811 — the programs have already been converted on the 6738 — and Bokaro Steel is also to get a 6811.

The latest entrant in the mainframe stakes in India is Univac, which acquired an Indian distributor when it bought Varian Data Machines last year. Varian V77 minis were marketed in India by Operations Research Group Baroda, and Univac has successfully extended the agreement to cover the 1100 line.

Univac's star is very much in the ascendant, and four 1100s should be installed in India within a year: one each for Air India and the Internal Indian Airlines reservations systems, and two for Bharat Heavy Electricals.

ORG has 200 employees on the computer side, 130 of them trained in computer science. It installed two V77-200 minis in India before Univac arrived on the scene, and wrote several pieces of software for them, including an IBM 1401 emulator, a linear programming package and a GASP-IV implementation. Work under way includes a text editor, a statistical analysis package and a general purpose

TCS insists that it is in no way responsible for the lateness of B80 software, and indeed the work done by the company is very highly spoken of within Burroughs.

simulation system, all to run under the V77 Vortex operating system, and two modules for Univac's USAS standard airline system. These consist of a P1024 protocol handler and a check-in module.

ORG staff have also worked on a Univac 1108 installation in Madrid. The company has been exporting software, much of it to the Soviet Union, for two years, and did 30% of its business abroad last year, discussions are under way with Univac on possible assembly of V77 minis in India.

ORG is also working with microprocessors, and will announce a micro business system and a data entry system shortly. Digital Equipment Corp is regarded very kindly by the government, and following suc-

TIM PALMER REPORTS FROM BOMBAY

Continuing his review of Indian Computing 1978, Tim Palmer this week takes a look at some of India's leading bureaux and software houses, notably Tata Consultancy Services, best known for its association with Burroughs, revealed in CW four years ago.

Research into television sub-titling for the deaf

UNDER a research contract worth £50,000 from Independent Television, Southampton University is working on the design of television sub-titling systems for the deaf in which shorthand keyboards and a computer would be used to produce text for superimposition on the picture.

The idea is similar to that being studied at Leicester Polytechnic with the BBC (CW, May 18) but with the emphasis on algorithms rather than large dictionaries.

The basic principles of both projects are the same: typists listen to the speech of television programmes as they are trans-

mitted, and record it on Palantype shorthand keyboards, which produces a unique kind of phonetic code. This is translated into English by computer in real time and displayed by the Cefax or Oracle caption facility.

The researchers at Southampton, led by Dr Alan Newell, feel that as it is not possible to produce perfect English spelling from the computer, owing to complications over proper names, the high error rates of the typists, etc, it is better to aim at having output that is understandable, possibly after some practice, but not standard English. So instead of translating the phonetic

Palantype codes by a one-to-one dictionary, the Southampton system uses algorithms to produce text that consists of a good many stylised phoneticisms. For instance, "friendly" might come out as "frendli" or "frend li". This has the advantage that keyboarding errors usually produce output that is recognisable, when dictionary systems have to give up on not being able to decipher a word. The computer storage required is also much less.

One important factor that has yet to be studied at Southampton is the acceptability of the sub-titles to real users. This is to come later in the project.



52 teams at the Palace

PLANS for the finals of the Computastars contest at the National Sports Centre at Crystal Palace on September 30 are building up and it promises to be a great day out for computer people, whether they are competing or just coming along for the entertainment.

A total of 52 teams have qualified for a place in the final, 29 men's and 23 women's, and they have all been invited to take up the challenge at Crystal Palace. Acceptances are already rolling in and the final list of contenders will be published shortly along with details of the programme for the day.

QUALIFYING TEAMS

MEN Rank Organisation, Plymouth; Wales Gas; Clerical Medical and General; British Steel; Rowntree Macintosh 1; Rowntree Macintosh 2; Platt Saco Lowells; Provident Management Services; Midland Bank, Sheffield; London Borough of Hounslow; Commercial Union; London Borough of Lambeth; Rank Organisation, Whitealeaf; Robert Home; London Borough of Kensington and Chelsea; Gordon and Goetz; Allied Suppliers; Ham-tres; London Transport; Midland Bank, London; EMI; Midland Bank, London; HANWEB; Department of Employment; Peterborough Data Processing; UCC; Solcon; ICL Scientific Languages; Diversify.

WOMEN Burnham Oil; Foster Wheeler; Rank Xerox; Woolworth; Midland Bank, Sheffield; Provident Management Services; Rank Organisation; Whitealeaf; Commercial Union; Paymaster General; British Relay Wireless; London Borough of Kensington and Chelsea; Allied Suppliers; CABS; Midland Bank, London; London Transport 1; London Transport 2; City University; HANWEB; Littlewoods; Inland Revenue; Peterborough Data Processing; Solcon; British Industrial Plastics.

CDC, NCR, Honeywell ahead in first half

FIRST half figures from Control Data, NCR and Honeywell indicate that the computer business is booming in the US, but profits at Burroughs' UK subsidiary turned down.

At Control Data, profits were up a healthy 36% to \$41.2 million on turnover up 18% at \$1,300 million. The Control Data computer business did particularly well in the second quarter with profit up 64% at \$12.3 million on turnover up 21% at \$449.1, confirming the company's confidence in the success of its large-scale Cyber machines (CW, July 20).

Because of the sale of the Appleton Papers division to British American Tobacco during the second quarter, NCR figures are a little difficult to interpret, but on any score they

look good, with net profit in the second quarter from continuing operations up 44% at \$39.8 million, on turnover up 7% at \$614 million. The Appleton sale gave NCR a non-recurring net profit of \$110 million, providing the company with an overall extraordinary profit for the half year of \$181 million on total turnover up 8% at \$1,239 million. Honeywell did particularly well in the second quarter, with net profit up 64% at \$41.8 million on turnover up 22% at \$663 million. In the first half, profit was 40% up at \$75.5 million on turnover up 20% at \$1,350 million.

Burroughs UK's first half ended on May 31 and in the period, the company's turnover rose over 16% to \$47.6 million, but profits fell back almost 40% to \$2.18 million.



When the weather conditions are just right, Julian Nott (left) and Colin Prescott will lift off for an attempt on the world distance and endurance records for hot air balloons. They will be taking with them a TI-55 programmable calculator from Texas Instruments to cope with such things as lift computations, head and weight formulae, navigation conversions, flight time estimates, and endurance calculations. The record attempt is sponsored by British Gas.

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New light on Honeywell relationship with NEC-Toshiba

WHILE the Fujitsu and Hitachi strategies for entering the world computer market are fairly plain, those of the other major grouping, NEC-Toshiba, have been clouded by their relationship with Honeywell and are difficult to discern.

The two companies developed a joint computer line, Acons 77, based on Honeywell's Series 80, but Toshiba has now effectively withdrawn from the large computer business and NEC is building the full line.

A joint company, NEC-Toshiba Information Systems has been formed in which NEC has 60% and Toshiba 40%. Toshiba's manufacturing facilities have not been included, but they are now effectively confined to refurbishing machines which come back from JECC, the Japan Electronic Computer Co.

In Japan, JECC is the sole rental agency for locally-built machines, buying them from the manufacturer and thereafter taking all the lease income itself. If a machine is returned before the contracted period of the lease, JECC requires the manufacturer to buy it back.

Unless these returned machines are refurbished and put back on the market they would be a dead loss to Toshiba, but the company has ceased to build new machines.

NEC has been a Honeywell licensee since 1962; computers are about 20% of NEC's business, and the company has 11% to 12% of the Japanese market.

Toshiba signed licence agreements with GE in 1963. Honeywell took them over when it acquired GE's computer business in 1970. Computers are only about 5% of Toshiba's business and the company has about 5% of the Japanese market, giving the combined NTIS about 17%, just behind Fujitsu.

"NEC developed the Honeywell 2000 line beyond our limits at the top end and had far more customers than we did," said Duke Sterling, Honeywell vice-

president for Japan. "As a result they have developed Level 64, which runs 200-2000 software, further than CII-Honeywell Bull, in order to satisfy these larger users."

There are eight models in the Acons 77 line. At the bottom end, the 77/200 is based on the Italian-built Level 62. The 77/300 and 400 match the CII-Honeywell Bull Level 64, and the 77/500 is an enhanced version of Level 64.

The French and NEC started to work together on this; it was a project called P7A. But CII-HB pulled out of the project and

"The reasons that we killed the 66/85 were purely economic," Sterling insisted. "IBM came out with the 3033 and it became clear that all the costs involved in putting into production a completely new processor which was only twice as powerful as the 66/80 just were not worth it, especially since the life span of the product seemed likely to be fairly short."

The principal differences between the 66/85 and the 77/800 and 900 are that Honeywell was planning to use CML-1 micro circuitry, which requires water cooling, whereas NEC and

allowed Honeywell time to rethink its strategy. May well have been a blessing in disguise. Such setbacks are anyway hardly rare in the computer industry: IBM cancelled FS, Burroughs dropped its B8700, Univac shelved its plans to merge 1100 and 90 series into a united line and Siemens has just dropped its plans to add a 7.770, taking instead the Fujitsu M-1801.

The Acons 77/800 and 900 were announced in Japan long before Honeywell announced the 66/85 mainly in order to have something to bid for existing cus-

Putting Japanese threat into perspective

MUCH has been written and said about the Japanese threat to the US computer industry, but a close examination of the businesses of NEC and Toshiba puts the threat into perspective.

Neither company makes a profit on its computer interests, and they are selling into a saturated mainframe market. The arrangement under which machines have to be sold to JECC for onward leasing relieves them of the necessity of building up large leasing finance facilities of their own, but at the same time requires that their market base grow rapidly each year, because the minimum JECC lease contract is only 16 months.

The Japanese market is about 12% of the world computer market, and local manufacturers have 57% of this. But Toshiba's 5% share means that it has a derisory 0.6% of the world market, and explains why it decided to pull out of the business.

NEC, which after Fujitsu has been the most

visible of the Japanese manufacturers, is now well placed to become the counterpoint to the Fujitsu-Hitachi combine, since MITI, the Japanese ministry of trade and industry, wants two Japanese computer lines, one IBM-compatible and the other not. Its 12% of the Japanese market implies about 1.8% of the world market, now boosted by Toshiba's base. Even so, it only spends about \$45 million on research and development annually, which is much less than its US counterparts, let alone that spent by ICL, which gets its R&D from the cheap by doing it in the UK.

The Japanese seem to be in preparing documentation, training personnel and setting up maintenance facilities make it almost impossible for NEC to enter the world mainframe market in its own right.

Why then are the Japanese companies establishing subsidiaries in the US? The explanation may be more defensive than offensive — that all the major US manufacturers are selling hard in Japan, and they need a source of

first-hand intelligence on developments in the US in order to stay competitive in their home market. The big missed opportunity for the Japanese was the failure to acquire any of the US companies which pulled out of the business. Toshiba had links with GE, and Hitachi with RCA, and Xerox and Singer were also allowed to slip away.

By following a closely IBM-compatible route — and harnessing the genius of Gene Amdahl, Fujitsu does have the potential to become a major force in the world market, and Hitachi, following a similar route and taking ICL as a partner is also well placed.

But the prospect for NEC appears to be largely confined to sales of peripherals, small systems, and above all components. It is quite possible that the Japanese will become undisputed world leaders in semiconductor component technology. The problem in a computer context is that these represent an already small and rapidly declining proportion of the total cost and value of computer systems.



FEW areas of Honeywell's computer business have been surrounded by as many misconceptions and wild rumours as its relationship with its two Japanese partners, Nippon Electric Company and Toshiba. In order to find out the facts, Tim Palmer visited Duke Sterling (pictured left), vice-president of Honeywell's Japan, Mexico and Canada division.

adaptations, but the costs of building up spares, and training people on maintenance would mean that it was not worth bringing them into the US if they were going to be replaced in less than five years.

The agreements with NEC

well's Level 8 mini for manufacture in Japan.

"Initially they are building the Level 6/43, but they will expand the line both up and down. They are at present taking the M08-200 executive."

While Nippon Electric is entering the US market via its company in Boston, which sells printers and is planning to introduce the NEAC-100 office computer, Honeywell, which continues to sell the NEAC-100 in Australia, is planning to enter the Japanese market.

"We also have an agreement with another of the big six manufacturers in Japan, Mitsubishi. In 1983, Mitsubishi Office Machinery, MOM, signed an agreement to market Bull products in Japan. They have sold Gamma 10s, G100s, Bull-CE 58s and Level 61s, and they also have 10 6000s (the Level 61 predecessor) installed with agricultural co-operatives."

The trading group to which Mitsubishi belongs is IBM's largest customer in Japan and, as a result, Mitsubishi has been looking more and more to Fujitsu as a partner. In 1980, MOM set up a division to market medium-scale Fujitsu systems, and in the process, Fujitsu acquired 14% of MOM.

"Ultimately MOM has to start marketing the large IBM-compatible Fujitsu M-series within the Mitsubishi trading group, but this has not happened yet."

"We are now negotiating to buy the division of MOM which markets our products," said Sterling.

"The new company is due to be formed in August; we will have 80% of the shares and MOM will have 20%, because MOM will have 20% of the current value of MOM. The current managing director of MOM will be the new president and the company will employ about 200 people."

"We will be selling Level 61, Level 64, and Level 66 machines to replace the 6000s MOM has sold, through the new company."

"The machines will be imported from France and the US; the Japanese tariff against imports is still tremendous, but it is nevertheless just worth being in business there."

Overall, how does Sterling see Honeywell's collaboration with its Japanese partners?

"Up to 1974 or so, the flow of information was all one way, since then NEC and Toshiba have had engineers in our plant collaborating on development projects. They came ostensibly to learn, but they were quality engineers and have made significant contributions."

Calls for papers

PAPERS are solicited for SEECO 79, a symposium and exhibition on Environmental Engineering Technology to be held at the Wembley Conference Centre, London, on May 2-4, 1979. The event is organized by the Society of Environmental Engineers and Technicians (SEET) in conjunction with the Institution of Chemical Engineers (IChemE) to mark its 20th anniversary. Papers will be selected for three sessions on: (1) Environmental Engineering in relation to the requirements of today and tomorrow for the future; (2) Environmental Engineering in the context of the world; (3) Environmental Engineering in the context of the UK. Details from the Secretary, SEECO 79, One Old Bailey, London EC4A 3DF, Tel: 01-403 7120.

PAPERS are invited for the International Symposium on Flow Control in Networks to be held on February 19-21, 1979, in Paris. The organizer is the Institut de Recherche en Automatique Industrielle (IRAI) and the Institut de Recherche en Automatique Industrielle (IRAI) and the Institut de Recherche en Automatique Industrielle (IRAI). Details from the Secretary, IRAI, 100, rue de Valenciennes, B.P. 109, 75156 Paris, Tel: 01-49 44 00, poste 60.

Some of the gripes levelled against the banks is that they are slow and impersonal, and that bank statements arrive irregularly. As a result of an experiment at the Kinross branch of the Clydesdale Bank, all its branches will be linked into a nationwide system.

Laura Tatham looks at the system which promises, not only to give faster transaction processing at the counters and tighter management control, but also that cheques and paying-in slips will disappear. A record of each transaction will also be given.

Writing of cheques soon 'thing of past'

By Laura Tatham

MORE convenient banking, more personal service and better record keeping are among the services Americans most want from their banks according to a recent market survey by Citicorp, New York's largest banking company. Britons, who by now suspect that the long promised real time Utopia is a figment of the clearing banks' imagination would, no doubt, express similar views if consulted.

Customers of Scotland's Clydesdale Bank (a wholly-owned though largely autonomous subsidiary of the Midland) will soon be luckier than most of us. The outstanding success of a pilot scheme now in operation at two branches marks the start of a project that will put even the most remote of its 368 branches online via a total of 1,500 terminals linked in a countrywide network.

Earlier, more accurate transaction processing at counters and tighter management control will not be the only benefits that Clydesdale will derive from its Autobank system. For customers, its most attractive features are likely to be that the writing of cheques for their own withdrawals and of paying-in slips will be a thing of the past; and that a single magnetic stripe plastic card will be the passport not only to these but to other services such as cash dispensers.

Clydesdale, whose system is considerably more sophisticated than any yet announced by any major British or American clearing bank, has directly benefited by the canniness with which it has approached computing in the past. Having, until now, remained aloof from any batch operations, it has been able to cash in on the advantages now available through the use of minicomputers and other low cost components.

As a result, though Autobank will incorporate a remarkably comprehensive range of facilities and fail-safe features, its total cost will be less than half of that of a more conventional solution.

The Autobank communications network will incorporate 16 Univac V77 minicomputers. These, installed in pairs at seven regional centres and at the bank's head office and computer centre in Glasgow, will cover the whole of Scotland. Each V77 will serve a group of 15 to 20 dedicated telephone lines to each of which a total of up to 18 terminals in several branches will be connected. For the pilot scheme, pairs of V77s have already been installed at one regional centre and at Glasgow.

Special hardware and software, designed by Lion Systems Developments of High Wycombe, automatically switches the lines served by one V77 to its partner if it develops a fault, and

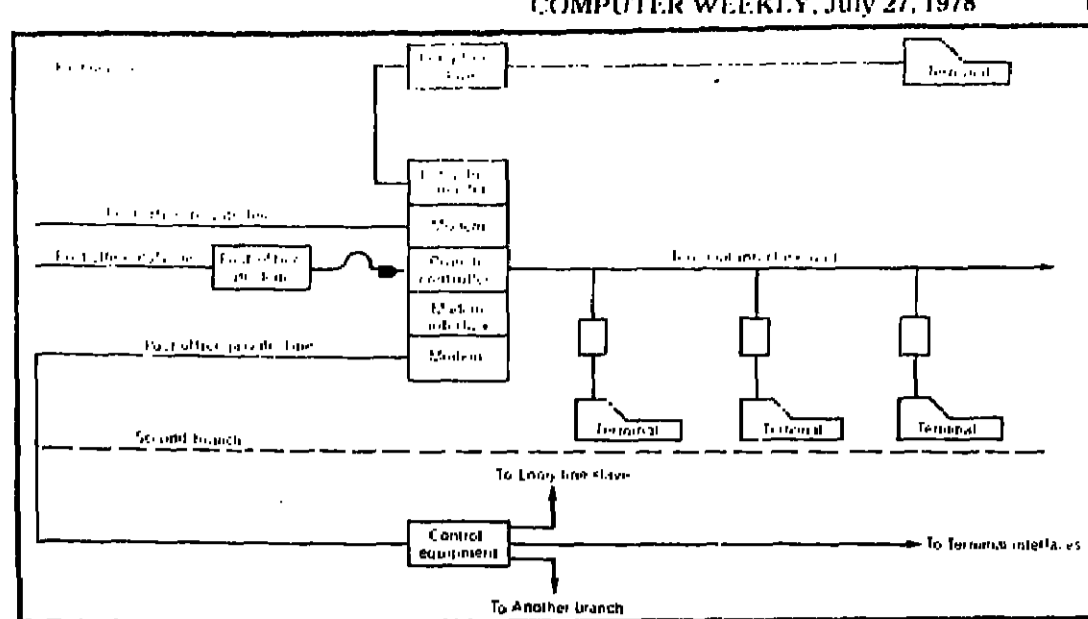
reverts to normal after the fault has been rectified.

Software added by Univac to the V77 Vortex operating system causes each computer to dump all the records it accumulates onto the disc of its partner at one-second intervals. Service will therefore continue without interruption if one processor goes down, though response time may be slightly slower than the normal 1.3 second average.

Before Fortronic, a small young Scottish firm and a customer of the bank, demonstrated its ability to produce a purpose designed low-cost terminal, the Autobank project had

reached a position of stalemate. Derek Gall, manager of the bank's automation and research department, had formulated very clear ideas about system performance and was convinced that his criteria could be met only by equipment and software more advanced than those designed in the 1980s.

Discussions with several mainframe companies, however,



The system flow chart shows the configuration that will be installed at each of the Clydesdale Bank's branches. An interesting point is that the system uses both ordinary telephone lines and tie lines.

drew a blank. "Impossible, either in your timescale or at the price you are prepared to pay" was their unanimous verdict. The cost of 1,500 terminals at a minimum of £2,000-£3,000 each was, of course, a major obstacle.

Fortronic — a company that since its inception in 1970 has looked for organisations with problems rather than marketing standard hardware and software — accepted the challenge to design and manufacture a terminal that fulfilled all the bank's requirements and would cost under £1,000.

Sentimentality and rash speculation are not characteristics traditionally associated with Scottish bankers and the directors of the Clydesdale are no exception. Though patriotically pleased at the prospect of employing native knowhow and enterprise, they were prepared to do this only on a shared risk basis.

"Work out a solution and install prototypes at minimum cost," they told Fortronic. "If

lines if this is necessary to improve response time. Designed and built by Lion, this control unit, which also incorporates diagnostic indicators, is compact and low-cost. Its function is to scan each terminal for a "request to send" signal and, on receiving this, to lock out the others until the message is complete. It also controls incoming computer messages. Using other special equipment, very small branches will operate as slaves to the nearest larger ones.

At Kinross, one of the two pilot sites, a customer wishing to make a withdrawal or pay-in passes his Autobank card to the teller and names the type of transaction. After he has entered his personal number on the keypad beside him, the teller initiates the routine through the terminal and checks the customer's identity via its card reader. She then enters the amount including, where appropriate, the denominations of notes and coins.

After verification by the terminal the input data is transmitted to the regional V77. A duplicate record is printed on the terminal tally roll — one copy for the customer and the other for retention. All transactions

detail is logged by the regional computer and remains available for interrogation. In consequence, day-end cashing up is now a quick and simple job for tellers.

Regional data is also transmitted to the head office V77s which accumulate it on magnetic tape. After closing hours, these tapes are transferred by hand for batch processing on the bank's mainframes.

All the Univac V77 control functions are handled by the standard Pronto transaction processing software slightly enhanced to accommodate the Fortronic terminals and other special requirements. This, operating under the Vortex multi-tasking operating system, has contributed greatly towards the remarkably quick development of Autobank.

In a short space, it is difficult to describe the other fallback measures so it can merely be stated that these leave no loophole. Additional control of the network is provided by a facility that may well be unique — a video terminal at head office which permits traffic monitoring on all lines and, if considered necessary, redistribution of traffic.



When the transaction has been completed, a duplicate record is printed on the terminal's tally roll. One copy is given to the customer and the other is filed. The details are also logged by the regional computer. This feature makes cashing-up a quick and simple operation.

INTERACTIVE computer graphics for engineers is the title of a three-day course to be held at the University of Loughborough on September 25-27. It is intended for engineers already experienced in the use of computers. Details from the Computer Graphics Course Secretary, Dept. of Engineering, The University, Loughborough LE11 3TU, Tel: Leicester 05090 — ask for Engineering Department.

A BASIC skills division programme has been designed by Intofach to provide training in the fundamental skills of programming and systems development. Beginners can choose either Cobol or PL/I basic training and for more specialist and systems programming, CS/1 and CICS training is available. Further details contact Intofach International on Maidenhead 0631.

A COURSE for the management of potential disasters has been organized by Kendall-Sheila. It will take the form of a

series of two-day seminars spread over a period of months, the first being held on October 5-6, and the last in May 1979, in Birmingham. Details from Mrs Veronique at the College, Slough 34880 ext 48.

SUBJECTS of courses to be run by the NCC in the near future include systems analysis and design, to be held in the Midlands on September 11-23, Filetab programming, Manchester, September 18, and real time program design, Manchester, October 22-November 3. For details of all the NCC's courses contact the National Computing Centre, Oxford, 1924. A special feature will be workshop sessions on problems projected by course members to help them improve their own

systems. Further details can be had from Tom Stewart or John Wilcox, Department of Human Sciences, Loughborough University, Tel: Loughborough 63171, ext 302 or 305.

A COURSE in operations management leading to the award by the CMAA of the postgraduate Diploma in management studies (operations specialist) is offered by Slough College of Higher Education. Details can be obtained from Mrs Veronique at the College, Slough 34880 ext 48.

THE Department of Business Studies at Loughborough College is offering two evening courses in computing in the autumn term. The introduction to computers and systems analysis begins on Tuesday September 18, and the Cobol course on Thursday September 28, and each comprises ten sessions. Further details from the Department on 01-508024.

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This company, a subsidiary of an extremely large engineering consultancy group, specialises in producing individually tailored industrial systems, usually based in either PDP 11 minis or INTEL micros. All successful candidates can have a career leading to Chief Engineer and above - your capabilities and drive will be well rewarded. Applicants should have at least 1 years mini or micro systems experience with a good knowledge of a low level language. If you also have an Engineering or Electronic degree and/or experience of hardware design, this could prove extremely useful.

A career with this company will ensure total involvement in the latest techniques and applications of this type of processing.

Contact: Andy Wright

Sales Support Programmer

London E1

c. £6,000

After almost 15 years successful operation as part of a £200 million organisation, this bureau has recently entered the turnkey market with small business systems based on the TEXAS 99/10 mini.

Demand for their product has been such that JBA has now been retained to recruit an ambitious Programmer to join their new 'pre' and 'post' sales support team. You will have had good COBOL experience plus some systems design and analysis involvement.

Continued growth in this area indicates that the successful candidate can expect promotion to more senior positions quickly. An ideal opportunity to move into a marketing orientated environment. Contact: Andy Wright

For further information on any of the above vacancies please contact the appropriate consultant.

If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES, International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

Engineer/Instructor

Herts

c. £6,000

A progressive and expanding mini computer manufacturer has an opportunity for an experienced field engineer to join its training department, to teach both the principles of field engineering and specific equipment.

Candidates should have experience in the maintenance of mini computer systems with a sound knowledge of storage, tape and discs, data communication and processor operation. Together with a good appreciation of software. Previous instructing experience is desirable but potential and ability plus the desire to teach are vital.

This is an ideal career step for an engineer wanting to broaden his horizons. Excellent salary and fringe benefits. Contact: Jim Baker

Programmers

London

up to £5,600

We have been retained by a large organisation to recruit several Application Programmers to join the expanding development teams. The installation, which is based on ICL 2980's use both communications and database techniques.

Candidates should have a sound commercial programming background, preferably using COBOL on ICL hardware, and a willingness to be retained on the 2980. The more junior positions require at least two years experience and probably four or five for the senior vacancies. Knowledge of teleprocessing, real-time systems or database would be an advantage. This is an excellent opportunity to work with professionals in a sophisticated and original environment.

Salaries are negotiable according to experience. Non-contributory pension scheme. Contact: Jim Baker

AUSTRALIA

Computer professionals with more than 3 years experience who are determined to emigrate to Australia will benefit from our consultancy service.

Initially, we advise and provide an assessment of your career prospects in Australia and, later, when your arrival there is imminent, you receive the concentrated services of our Associate company in setting up introductions to suitable vacancy positions in Australia.

Since JBA commenced this service we have been extremely successful in arranging a selection of possibilities for people arriving there (mainly in Sydney and Melbourne) and the people concerned thereby found ideal employment very quickly. Contact: Mike Creamer

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starting salary around **£7,500**

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1. Development and implementation of inventory control and distribution systems
2. Staff Control
NB: The post will involve travel

REQUIRED PROFILE

1. 6-7 years' DP experience including programming
2. Proven ability in all phases of project development
3. Ideally experience of project control and knowledge of IBM 370/158 and mini-computers



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consultancy division

01-540 8311

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Iran - the turning point for Data Processing Experts

In a country where the emphasis is very definitely on the future, Bell Helicopter International are supplying a logistics and training support service to the Imperial Iranian Army Aviation. It's an ambitious project, demanding extensive data processing facilities and a large integrated data base, housing the highly flexible Honeywell 6000 system, has already been established. Consequently, the wide cross-section of DP talent we require will certainly find two years' in Iran time well-spent.

**£11,200-
£12,400 p.a.
tax-free**

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Four years' experience with at least two years of recent Honeywell experience, utilising COBOL 68 and Integrated Data Store (IDS) programming language is required.

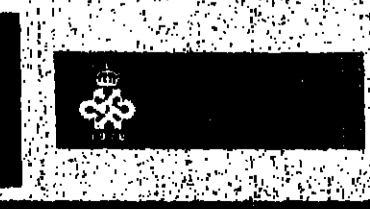
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Two years' recent experience in designing and maintaining data bases utilising IDS utilities is required. Knowledge of IDS internals is desirable.

As part of the Bell Helicopter International team, experience isn't the only benefit you'll derive from a two-year contract. Culturally, you'll learn a lot in a country which manages to blend history with a very progressive outlook, and where you and your family can live comfortably in a balanced climate.

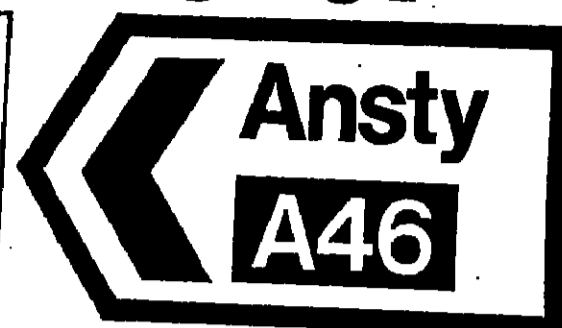
Financially, you'll receive a tax-free salary, a housing supplement of £365 per month plus a child allowance of £480 p.a. If accompanied. Generous relocation expenses will help you make the transition from the UK and there are also free flights home with leave arrangements.

There's nothing to lose and plenty to gain from spending two years in Iran, so write with brief cv quoting ref. no. 337 to Ian Gregory, IAL, Aeradio House, Hayes Road, Southall, Middlesex, Tel: 01-574 5021.



Bell Helicopter International Bell Helicopter TEXAS

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As for where you'll live, like most of us here, you'll find Nuneaton, Hinckley, Leicester, Rugby, Coventry, Leamington and Warwick ideal. Generous assistance with relocation expenses will be given where appropriate.

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Rolls-Royce Limited, Industrial and Marine Division

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Post Ref T266 Grade AP4/5
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We can offer careers with real variety, developing an extensive range of systems for all departments of the County Council.

Our ICL 1904S with more than 50 terminals operates on the George 3 system. This configuration is shortly to be enhanced to 250K with additional peripheral equipment. Further development involving the use of terminals is planned, and where applicable new techniques will be introduced to assist in the implementation of these applications, and any necessary training will be given to ensure that sound, practical solutions are found.

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Please write or telephone for an application form quoting the appropriate post reference to the Chief Executive, (Personnel), South Yorkshire County Council, County Hall, Barnsley, South Yorkshire S70 2TN. Telephone Barnsley (0226) 86141 Ext 240.

Closing date for applications is 9th August 1978.

**South Yorkshire
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Up to £5,346 + bonus

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oxford polytechnic

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Salary Negotiable

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If you would like to discuss this requirement, contact PAUL HILL, Director Square One, on CHESHAM (02405) 74161. If you prefer to ring in the evening, leave a message on our answering machine.

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SA

Computing Services Association

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SENIOR SYSTEMS ANALYST - North West

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You will be supported by professional Systems Analysts and Software houses as needed. Current operations, which include maintenance programming.

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To be successful in this appointment you will need sound experience of setting up and developing systems in a similar environment and be fully committed to a profit conscious approach, aimed at improving business performance. It is unlikely that anyone with less than five years' experience will have the necessary background.

We are located in the North-West of England at Skelmersdale, where housing is reasonably priced both in town and country and with good access via the M6 and excellent rail links to other parts of the country. The salary will be very attractive to the right person and where appropriate, relocation expenses will be paid.

For further details and a chat about this challenging opportunity, telephone Ian Pearson, Systems Manager, on Skelmersdale 24124 or write to him at BOC Limited, 2 Peel Road, West Pimbo, Skelmersdale, Lancs.



Engineering Division

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Faculty of Science
SCHOOL OF COMPUTER SCIENCE

PRINCIPAL LECTURER IN COMPUTER SCIENCE

The person appointed to this post will, in addition to teaching to honours degree level, be expected to play a leading role in co-ordinating the data processing research activities within the School of Computer Science. Applicants should be honours graduates with appropriate post-graduate experience. Candidates should state their teaching and research interests.

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Programmer/Analyst

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Project Leaders

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Safe Computing specialises in production control and its package, SaFeS (Small Factory System), is the most successful product currently available in the UK achieving over 60 sales to date.

Other software packages include SOLAR, a ledger accounting package, SOFA, a market leader in solving inflation accounting problems, and SCIRT, a job costing system.

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The jobs available within Safe Computing are for those interested in applying minicomputer solutions in a practical business environment. There is plenty of opportunity for customer contact and supervision of projects through to completion.

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LECTURERS

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Applications in duplicate stating full personal particulars, qualifications and experience should reach the Staffing Office, University of Western Australia, Perth, Western Australia, 6009, by the closing date, 17th August 1978. Candidates should enclose three references in writing immediately in the Staffing Office.

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The Operator will be expected to have a minimum of 6-10 years' experience of operating a DEC/VAX-11/150 and 3-5 years' computing experience.

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37 1/2 hours week. Local Government Superannuation Scheme in operation. Salary Scale R17.1 to £3275 per annum.

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- ★ Annual Bonus
- ★ Salary £6,000

REF 1586

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EXCITING opening for a computer science or engineering graduate with some exposure to Mini computers. Be part of team involved in analysis, design, implementation and maintenance of software for multi-computer data acquisition and control systems to meet requirements of off-shore rig in the North Sea. Candidates should ideally have some exp. in REAL-TIME and have knowledge of ASSEMBLER.

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- ★ Beautiful coastal location in scenic countryside
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REF: 1857

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- ★ Excellent career prospects
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REF: 1638

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- ★ Varied work of a highly interesting nature
- ★ First-class perks including RELOCATION expenses
- ★ Salary range £11,000-£13,000 p.a.

REF: 1853

MINI PROGRAMMERS

We would like to hear from programmers on behalf of our clients with good MINI exp. If you have had at least 2 years' experience of ASSEMBLER on any mini computer - contact us immediately to discuss on-going projects in the above countries

- ★ Accommodation and expenses paid by company
- ★ Renewable assignments
- ★ Excellent scope in a variety of areas
- ★ Salary £12,000 neg A & E.

REF 1803

ICL PROGRAMMERS

Due to development of their advanced computer systems, successful D.P. services dept seeks to boost its programming team. Retaining large ICL 1900 equipment they offer excellent opportunities for persons with minimum 2 years' ICL COBOL & PLAN experience.

- ★ Training on IMS Database
- ★ Development to analysis
- ★ Opportunities to join at SENIOR level
- ★ Applications in various areas providing an absorbing and interesting career
- ★ Excellent perks include flexible working hours & 8 WEEKS' HOLIDAYS
- ★ Salary to £5,500

REF: 1649

SYSTEMS ANALYST PROJECT LEADER DESIGNATE

International company engaged in manufacturing, distribution and sales of well-known commercial products, seeks a person with design and implementation of either stock control, order processing, warehousing or sales forecasting systems in an IBM environment. He or she should have the potential to control project team developing one or more of the above systems.

- ★ Excellent work environment
- ★ Paid overtime
- ★ Flexi hours, 4 weeks' holidays
- ★ Company expansion with additional hardware
- ★ Distributed processing
- ★ Salary £5,800 p.a.

REF: 1627

PROJECT LEADERS

An outstanding opportunity exists within international finance group for 2 project leaders with experience at that level on ANY hardware platform in financial or insurance areas. Ideal candidate will have dynamic personality, confidence and self-motivation, be able to liaise at all levels and responsibility to act on own decisions.

- ★ Security in a growing organisation
- ★ Mortgage assistance/STLS/Non-contributory pension
- ★ 4 weeks holiday/sub restaurant
- ★ OPPORTUNITY TO TRAVEL ABROAD
- ★ Salary £7,000 +

REF: 1848

MINI PROGRAMMERS

Prestige company operating on a global scale are recruiting persons with 1-3 years' exp. on ANY MINI ASSEMBLER to work in their new modern city offices. Having large DEC PDP II equipment and expanding at a rapid rate they have a wide range of on-going projects both in hardware and software areas.

- ★ Extensive training in up-to-date technology
- ★ Excellent career opportunities
- ★ Training in RSXII, RT11 and RSTS
- ★ Opportunity for future travel
- ★ Salary £6,500 c

REF 1478

ANALYST PROGRAMMER

Our client a major preservation society based in rural Wiltshire have vacancies for analyst programmers with at least 18 months' 'RPGII' experience. They are involved at present in taking over all major systems from their head office and have their development work planned for the next five years. Co offers -

- ★ Variety of exciting new development work
- ★ BEAUTIFUL rural surroundings with very reasonable house prices
- ★ Generous RELOCATION assistance
- ★ Salary £5,000

REF 1637

PROGRAMMERS

Management services division of major British group with annual turnover of almost £1,000m seeks COBOL programmer with minimum 2 years' IBM or ICL COBOL. Within a project team programmers will become involved in program design, coding, testing, documentation and maintenance as well as assistance in systems implementation.

- ★ Comprehensive range of applications
- ★ Opportunity to move to more advanced technical projects and a variety of languages and machines
- ★ Paid overtime - flexi hours - sub restaurant amongst many of the excellent perks
- ★ Relocation expenses
- ★ Salary to £5,500

REF: 1824

JUNIOR PROGRAMMERS

Multi-national company retaining large IBM 370 hardware requires programmers with at least 12 months' ASSEMBLER experience to join highly professional team. They are currently developing a major sophisticated on-line system.

- ★ Highly progressive organisation
- ★ Continued development with a well-planned schedule
- ★ Good promotional prospects
- ★ Excellent benefits including cheap travel
- ★ Salary to £6,000

REF: 1290

ANALYST PROGRAMMERS

One of the country's leading retail organisations seeks analyst programmers to work at local level on the development of new interactive and distributed systems. Co currently retain Burroughs 6700/4700 series hardware and are also investing in PDP II equipment. They seek persons with 2 yrs exp in design analysis and/or programming (ANY LANGUAGE) to make a career with them.

- ★ Unusual opportunity to learn new languages and get on to MINI computers
- ★ Significant user contact
- ★ RELOCATION expenses
- ★ Salary to £6,150

REF 1655

ANALYST PROGRAMMER

Electronics manufacturing co working on a scale seeks clear, logical thinking analyst programmer for their ICL 1900 series equipment.

- ★ Control of small development or support projects
- ★ Supervisory exp
- ★ Full scale of projects ranging from package to financial modelling
- ★ Subsidised restaurant/dining club
- ★ Salary £5,500

REF 1191

PROGRAMMERS

A major organisation in the retail trade is pursuing further interests at a rapid rate. Retaining NCI Century equipment with a Citron V860 scheduled for delivery at the end of the year, they seek programmers with 3 yrs COBOL exp on any machine for their major control system utilising TOTAL database.

- ★ Plenty of new development work
- ★ Training in Database
- ★ Sports and social club in beautiful, green, landscaped grounds, squash courts, etc.
- ★ Excellent perks - LVs, discounts on goods
- ★ Salary to £6,250

REF: 181

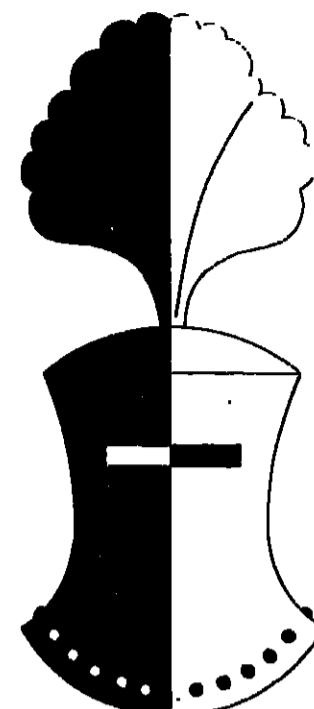
SYSTEMS ENGINEER

World-wide manufacturing company with office in Frankfurt seeks engineer for sophisticated communications systems. Ideal applicant should have in-depth experience of communications message switching on any MINI. Good knowledge of GERMAN is essential. Co offers -

- ★ Relocation expenses
- ★ Good career prospects with excellent growth potential
- ★ Generous fringe benefits
- ★ Salary to £15,000

REF 109

Computing Services Association



CONTRACT MIDLANDS & N. ENGLAND

PROG IBM COBOL DL/I
SNR PROG IBM CICS ASSEM
DATABASE DESIGNERS ENGINEERING
SYSTEMS ANALYSTS FINANCIAL
PROG IBM PL/1 CICS
PROG HONEYWELL 66 IDS/TDS COBOL
PROG ICL 2960/2970 VMEB/K
PROG UNIVAC 1108 COBOL
SYSTEMS ANALYST IMS DB/DC

MIDLANDS
NORTH WEST
NORTH WEST
SCOTLAND
MIDLANDS
NORTH WEST
YORKS
NORTH WEST & MIDLANDS
NORTH WEST

FOR DETAILS OF THESE AND OTHER CONTRACTS, PLEASE CONTACT MR. PERRY BUTLER, 143/144 ROYAL EXCHANGE BUILDINGS, CROSS ST., MANCHESTER, M2. TELEPHONE NO. 061-833 9341/3.

KNIGHT PROGRAMMING SUPPORT LIMITED

520 ROYAL EXCHANGE, MANCHESTER M2

OFFICES: AMSTERDAM, PARIS, BRUSSELS, LONDON, BIRMINGHAM



AUSTRALIA

Management Application Systems P/L, a software consulting company, is urgently seeking experienced EDP personnel on behalf of ourselves and a number of clients in various industries. The positions are in Sydney and Melbourne and some are offering paid air fares to Australia for successful applicants who are able to relocate at an early date.

6 PROGRAMMERS

A large company using an IBM 370/145 under OS requires competent programmers on 12 and 24 months contract basis with opportunity for continual employment available after contract period.

Qualifications:

- At least 2 years' programming experience
- At least 2 years' IBM OS COBOL programming experience
- Recognised diploma or degree in computing
- Applicants will desirably have experience in any of the following:
 - programming experience in another language - ASSEMBLER, PL1, FORTRAN, TAB/TAB 360
 - experience with interactive timesharing - TSO
 - Database applications - IMS
 - Prior experience in ICL 1904A GEORGE 2 or 2+

Remuneration - return air fare UK-Melbourne
- Initial accommodation
- 4 weeks' annual leave
- salary - minimum \$13,000 depending on experience
- nine day (70 HR.) fortnight.

Applications will be considered only from people who definitely intend to go to Australia.

The above (and other positions) offer participation in challenging and interesting projects under pleasant working conditions. The successful applicants will be given all possible assistance in relocating and settling in Australia.

We will be interviewing applicants in London from 8/8/78.

Written applications with detailed resume (and telephone no. for personal contact) should be submitted to: R. M. Blythe, c/o M. Bretherton, Hoskyns Ltd., 145 St. John's Street, London, EC1.

CAREER OPPORTUNITY IN

IRAN

A major Iranian computer service bureau needs the following Data Processing Professionals to meet the demands of a rapidly expanding business.

SYSTEMS PROGRAMMER

Minimum 5 years' experience. Knowledge of 370 Assembler, COBOL, DOS/POWER/VS, CICS essential. Experience in data base design and computer systems measurement + performance enhancement would be advantageous.

SOFTWARE DEVELOPMENT

Design and development of new products. Knowledge of 370 Assembler COBOL and DOS/VS plus 5 years' experience.

SYSTEMS ANALYST

At least 5 years' experience including successful implementation of at least one major project. Familiarity with on-line applications and data base management would be advantageous in satisfying the position objectives.

Applicants for all the above positions should possess a University degree. Interviews will take place mid-August in London. All applications will be acknowledged.

Please submit resume in strict confidence including salary history to

CMS IRAN-HAMBURG CO. LTD.
Steintorweg 4-6
Hamburg 1, West Germany

SHEFFIELD CITY POLYTECHNIC DEPARTMENT OF COMPUTER STUDIES SENIOR LECTURER IN INFORMATION SYSTEMS

Salary Scale £6557-7085 (bar)

- £7572

Applications are invited from well qualified candidates to teach aspects of data processing to undergraduate courses in computing as well as courses in business studies. Ideally candidates will have industrial experience as well as a particular expertise in the data processing area. The successful applicant will be required to assist the departmental training tutor in the placement of students in industry and an interest in this activity is therefore essential.

Requests for an application form in writing only, please, to the Recruitment Section of the Personnel Department, Sheffield City Polytechnic (Dept. COV), Halfords House, Fitzalan Square, Sheffield S1 2BB. Completed forms should be returned by 31st August.

OPERATIONS MANAGER

ORPINGTON, KENT UP TO £5,500 p.a.

The Harris/Queensway Group is a rapidly expanding carpet and furniture retail organisation with branches throughout the U.K. We have installed a Hewlett-Packard 3000 computer (182K bytes processor, disks, tapes etc) at our new head office in Orpington. This supports a variety of commercial work with extensive use of on-line terminals.

We urgently require a manager to be responsible for all the operations function. Applicants must have at least two years experience of computer operating and preferably some supervising experience. Experience on any computer with a sophisticated operating system is relevant. The job will be particularly attractive to someone who is a fast learner and who is happy to work on a variety of tasks with little supervision, in a small installation.

No shift work is necessary and working conditions are excellent.

Please telephone or write to:-
Roger Lawson
Group Data Processing Manager
Harris Carpets Limited
Harris House, 78 High Street
Orpington, Kent
Telephone Orpington 38877



Data Processing Department

Bexley will start in-house data processing from August, 1978. The equipment will consist of a 1 megabyte IBM 370/138 using DOS/VS, POWER/VS with CICS, PLANCO and DL/I. An extended VDU communications network is also planned. Data entry will be by REDIFON R300. A two shift system will operate.

SENIOR OPERATOR

GRADE AP3: £4,017-£4,431 including London weighting and supplement + shift allowance of 14% of basic salary and £106 per annum. Successful applicants should have at least two years' operating experience, especially on IBM Mainframes using DOS/VS. A knowledge of JCL would be of considerable advantage.

OPERATOR

GRADE AP2: £3,664-£3,936 including London weighting and supplement + shift allowance of 14% of basic salary and £106 per annum. Applications are invited from existing IBM operators with at least one year's relevant experience.

Please write or telephone for an application form to D. Jarvis, Operations Manager, Data Processing Department, 9 Brampton Road, Bexleyheath, Kent, 01-303 7777 Ext. 782. Closing date: 18th August, 1978.

Bexley London Borough

Senior Computer Operator

Salary £3278-£4148 (including supplement), required in Borough Treasurer's Department for ICL 2904.

Consideration will be given to provision of housing accommodation and payment of removal and legal expenses.

Starting salary will be dependent on age, experience and qualifications, etc.

Application form from Borough Treasurer, P.O. Box 4, Town Hall, Gosport, Hampshire (or telephone Gosport (07017) 84242, ext. 102).

Gosport Borough Council

Recruitment Consultants
Calling
Programmers
Contract &
Permanent
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0565 4925
TODAY!

CONTRACT DIVISION

OVERSEAS

MESSAGE SWITCHING BURROUGHS 6600S HOLLAND £450 p.w.
PDP FORTRAN BELGIUM £400 NEG
PDP FORTRAN IV RSXII IRAN EXCELLENT
PL/I PROG LONG CONTRACT PARIS £300 p.w.
HONEYWELL 6000 GDS COBOL
FORTRAN ADV. BELGIUM £NEG + EXP
PDP RSXII LONG CONTRACT DENMARK EXCELLENT

ANALYST PROG IMS COBOL
IMS COBOL PROGS
PDP RSXII FORTRAN
PDP RSXII MACRO II
SNR ANALYST DATABASE DESIGN
BURROUGHS 6700 COBOL
DL/I COBOL PROGRAMMER
PDP MUMPS/BASIC OR ASSEMBLER
ICL GII COBOL
PDP RSTS BASIC +
ANALYST PROGRAMMER/IMS
1900 COBOL GII

BEDS £250 p.w.
HERTS £250 p.w.
BERKS £250 p.w.
HERTS £250 p.w.
HERTS £250 p.w.
SURREY £250 p.w.
KENT £250 p.w.
CRAWLEY £250 p.w.
C. LONDON £250 p.w.
HERTS £250 p.w.
HERTS £250 p.w.
HERTS £180 p.w.

Phone now for details of the above and other requirements
Ring Christine Kay/David Hayton, 734 0162 (24 hrs.)

KNIGHT PROGRAMMING SUPPORT LIMITED

27 NOEL STREET, LONDON W1. TELEPHONE 01-734 0152/6 (24 HOURS)
OFFICES: AMSTERDAM, PARIS, MANCHESTER, BIRMINGHAM



SALES PERSON HOLLAND

As Europe's largest suppliers of contract computer personnel to Holland, we require an additional sales person for our Amsterdam office. The successful applicant will probably have some sales or marketing experience. However, consideration will be given to applicants with good computer experience, who have knowledge of Holland. He or she will be self-motivated and keen to travel. Remuneration will include generous guaranteed basic income, and a substantial commission. We will expect a successful person to earn in the range of £15-£25,000 p.a. A car will be supplied.

Please reply to:
The Directors
Knight Programming Support Ltd
27 Noel St. London W1
Telephone 01-734 0152 (24 hours)



THE UNIVERSITY OF LANCASTER

SENIOR SYSTEMS PROGRAMMER

Applications are invited from either sex for the post of Senior Systems Programmer with the Computer Services Department.

This is a senior post and the appointee will be expected to provide leadership in the implementation of operating systems in use by the Department and to advise on future developments.

The present computer is an ICL 1900. This will be replaced by an ICL 2904, totally using DME and new VMEC operating system. The Senior Systems Programmer will be responsible for the software installation of this computer and for the development of new software for the ICL 2904 in the North-West Network in collaboration with other universities.

Experience in communications systems and software would be advantageous.

Salary on the scale £6,864-£7,308.

Further particulars may be obtained from the University of Lancaster, The Establishment Officer, University House, Lancaster, LA1 4YW. Applications should be sent to the Establishment Officer, University House, Lancaster, LA1 4YW, by 1st August, 1978.



Data Processing Recruitment Consultants

U.S. Banking Corporation City of London

Salaries: £6.5-8K + Mortgage

A major U.S. Banking Corporation with extensive computer facilities in the City requires additional D.P. personnel up to team leader level for both the Mini and Mainframe divisions. The Mini Division in particular requires COBOL programmers and Project Leaders possibly with a financial background. The Mainframe Division is in need of PL/I programmers with possibly COBOL or BAL as a second language. Whilst the IBM 370 operating system is O.S. our Client may consider competent DOS program-

mers. The ability to work as a member of a project team under strict documentation and programming standards is important. Mini programmers will have at least two years Real-time experience using COBOL and may also have experience of ASSEMBLER. In addition to above-market salaries the Bank offers a 2½% subsidised mortgage facility and personal loan scheme, private health and a non-contributory pension plan.

Ref: 18/A

Message Switching + Communications London or Home Counties

Salaries: £6.5-11K

A prestige International Client is seeking to expand and establish new project teams working on wide and varied applications areas with emphasis on Data Communications, Message Switching and Mini Software. Can you picture yourself working in the forefront of mini systems applications and software development? Become a member of one of numerous specialist project teams in which you will make a valuable contribution whilst at the same time expanding your own frontiers of knowledge and experience. This is a unique opportunity to enhance your career by extending your horizons and developing State-of-the-Art D.P. technology.

Successful candidates are likely to be either graduates (Computer Science or Maths) or have a very solid background in advanced computer applications and are probably aged between 23 and 33. You are presently likely to be either a Systems Designer/Consultant, Analyst Programmer or a programmer in a Mini computer environment with extensive Assembler experience. Any specialist expertise in the areas of Data communications, Message switching, computer networks, Process-control or Mini computer software will be considered particularly advantageous.

Ref: 18/B

Systems Designers + Programmers etc. Cheshire

Salaries: £6-9.5K (a.a.e.)

A very prestige client with headquarters in London and regional offices located in Cheshire and throughout Europe, urgently requires the following: Real-Time and on-line Programmers, System and Data base designers and compiler specialists with 2/5 years experience. Of particular interest would be people with relevant experience in one or more of the following: Ferranti DEC with Basic, RTL II or Coral and IBM

or ICL with Assembler, PL/I or COBOL. Also IMS or similar and Data Base design. The scope of projects is both broad and demanding and certainly in keeping with the prestige of this client. You will play an important role in project development and the opportunity to enhance your technical expertise is one of the attributes of working with this reputable group. Fringe benefits are well above average and full relocation expenses will of course be met.

Ref: 18/C

Real-Time Software E.E.C.

Salaries: £10-16.5K + Outstanding Benefits

When it comes to State-of-the-Art Real-Time Mini Software our client defers to no one. They are internationally regarded as technical frontiers pushers and as valued project team members you will share their prestige and acclaim. To meet a continued phased growth programme our client is establishing several new project teams requiring Consultants, Project Leaders, Analysts and Programmers. The latter will be well versed in

Assembler and the former will either be graduates or have extensive relevant experience in Real-Time software. Willingness to re-locate for a meaningfully extended period to one of the most desirable E.E.C. locations is important. Every assistance will be given to candidates and their families in re-location. Interviews will be held in London early in August and offers made within 7 days.

Ref: 18/D

RSX-11 Programmers E.E.C. + London

Salaries: Europe c.£15K + U.K. to 9K

Our clients, pioneers in frontier communications developments have contributed significantly to the accelerated advancements in Real-Time Mini Computer technology and are internationally recognised as market leaders in their field. In pursuit of maintaining their forefront leadership our clients seek to identify key personnel to join them in their next development phase. Real-time specialists with strong Mini Computer backgrounds experienced in the implementation of RSX-11 will make a vital contribution to the attainment of these goals within an environment offering the highest standards of professionalism.

job satisfaction and development potential. Successful candidates will ideally be graduates (computer science or related discipline) or will offer exceptional relevant experience in Real-Time software development. Applicants are likely to be currently engaged in Data Communications or Real-time systems and software development within either a mini implementation group or end-user environment. Interviews will be held in London early in August and offers will be made (to successful candidates) within 7 days.

Ref: 18/E

Logistix, Freepost 32, London W1E 3YZ
01 491 4636 Telex 28800
(Reverse charges)



Avon House, 356 Oxford Street, London W1N 9HA

Software for Avionics Systems CHELTENHAM

The Aviation Division of Smiths Industries has a heavy commitment in programmed avionics equipment now essential to the operation of modern high-speed aircraft, both military and civil.

So we are rapidly expanding our software activity to develop a variety of applications employing the most advanced systems technology.

These positions will attract specialists at various levels up to senior, with several years' relevant practical experience and a degree or equivalent in electronics, computer science, mathematics or other related subject. This includes newly-qualified graduates aiming for top-position experience.

You would work with small project teams, have computer access and considerable responsibility for your part of the software.

Real-time Airborne Software

Here you would design and program airborne mini and micro-computers for cockpit display, weapons guidance and flight control. A high level of job satisfaction-through direct contribution to aircraft performance and customer liaison-is assured.

Support Software

backs the equipment activity with the design production, adaptation and maintenance of compilers, assemblers, interpreters and design/analysis/documentation tools for airborne computer programming-including the support of a growing range of micro-processors.

We offer attractive starting salaries, plus the full range of benefits customary in a major international organisation-including relocation assistance to this pleasing area of the Cotswolds. If you are seeking advancement in a growth activity write to:

H. Upson, Assistant Personnel Manager,

SMITHS INDUSTRIES LIMITED

AVIATION DIVISION

Bishops Cleeve, Cheltenham, Glos. GL52 4SF.



ipc

SYSTEMS ANALYSTS PROGRAMMERS

HARROGATE

The North Eastern Region of the C.E.G.B. is responsible for the generation and main transmission of electricity in the eastern part of the country from the Scottish border to south of the Humber.

The Computer Branch is responsible for computing development and production work on an ICL 1904S computer, and bears functional responsibility for Regional work on the twin IBM 370/168 installation in London, and for computing developments utilizing mini computers elsewhere in the Region. It is intended within the next 18 months to replace the existing ICL 1904S/182K store.

EDS 80's, MT's etc., operating under George (II) by a current generation system with the capability of supporting a comprehensive communications network. It is expected that there will be a growth of distribution computing at larger Power Stations. As part of the planned development of management systems in the Region additional computing staff are required. The proposed applications include Materials Control/Purchasing, Costing and Budgeting, Work control and scheduling, Plant performance analysis, other engineering systems, maintenance and support of Production work.

Applications are invited for the following posts: **SYSTEMS ANALYSTS**

Applicants for these posts should have a degree or professional qualification and substantial experience of analysis and design. The salary will be within one of the following ranges:

£4000 to £4100 p.a. SVN 62/CW

£4100 to £4200 p.a. SVN 62/CW

£4200 to £4300 p.a. SVN 62/CW

£4300 to £4400 p.a. SVN 62/CW

£4400 to £4500 p.a. SVN 62/CW

£4500 to £4600 p.a. SVN 62/CW

£4600 to £4700 p.a. SVN 62/CW

£4700 to £4800 p.a. SVN 62/CW

£4800 to £4900 p.a. SVN 62/CW

£4900 to £5000 p.a. SVN 62/CW

£5000 to £5100 p.a. SVN 62/CW

£5100 to £5200 p.a. SVN 62/CW

£5200 to £5300 p.a. SVN 62/CW

£5300 to £5400 p.a. SVN 62/CW

£5400 to £5500 p.a. SVN 62/CW

The salaries will be within the following ranges:

PROGRAMMERS

£3900 to £4000 p.a.

£4000 to £4100 p.a.

£4100 to £4200 p.a.

£4200 to £4300 p.a.

£4300 to £4400 p.a.

£4400 to £4500 p.a.

£4500 to £4600 p.a.

£4600 to £4700 p.a.

£4700 to £4800 p.a.

£4800 to £4900 p.a.

£4900 to £5000 p.a.

£5000 to £5100 p.a.

£5100 to £5200 p.a.

£5200 to £5300 p.a.

£5300 to £5400 p.a.

£5400 to £5500 p.a.

£5500 to £5600 p.a.

Computer Data
Processing
Limited

EXPERIENCED OPERATIONS STAFF

Salary £4,400 p.a. (inc. shift allowance)

Due to further expansion, experienced operators and control clerks are required to join our efficient and hard working Operations Team.

The configuration consists of two large ICL System 4/72s plus VDUs and RJEs.

Ideally, applicants should have two years' experience on either System 4 or IBM 360/370 machines and a good knowledge of JCL.

Three-shift working is in operation in both the Computer Room and Control Department.

A 32½-hour week is worked plus four weeks' holiday after one year's service.

Our office is located very close to the main-line station (London 43 minutes and Brighton 15 minutes).

Applications to
Alan Merrion
Operations Manager
Computer Data
Processing Ltd.
Oakfield House
Perryman Road
Haywards Heath
Sussex
Telephone:
Haywards Heath
58188

PROGRAMMER

Required to join a small data processing department, currently operating an ICL 1901A Disc System. This system is scheduled for replacement shortly, and this is an ideal opportunity for the right applicant to gain development and installation experience.

Suitable applicants must have a minimum of between six months-one year Cobol experience and a knowledge of ICL Systems would be advantageous.

This is a progressive position offering an attractive salary, five weeks' annual holiday, contributory pension scheme, canteen facilities. Opportunities of advancement within the GKN Group.

Written applications giving all relevant details to:
The Chief Accountant
The Firth Company Limited
Wire Manufacturers
Nora Street, Warrington WA1 2JH
Tel. 0925 38881

GKN-Britain's largest
international
engineering group

BOROUGH OF SOUTH TYNESIDE DIRECTORATE OF FINANCE PROGRAMMER £3278 - £5073 inclusive

A COBOL Programmer is required, preferably with experience of GEORGE 2 to work in an ICL 1902A installation with input via Redifon Seachek.

The configuration is under review and a major upgrade is planned for the near future.

Application forms are available from the Chief Personnel and Management Services Officer (Ref: 64), Westhose Hall, Westhose Village, South Shields, Tyne and Wear (Tel: South Shields 552191) and must be returned by noon, 11th August, 1978.

Upgrade to 2970

and increase your professionalism in operations or support.

Our client is a dedicated team of computer specialists in West London, linked to a multi-national computer organisation, offering a bureau service using

1904S•1904A•1902T•2970•G2/3•Communications•MAXIMOP•IDMS
They offer the opportunity to gain valuable experience in this mixed environment to -

Operators and Team Leaders

You must be energetic, ambitious and capable with experience relevant to the above - at least 9 months for Operators; 2/3 years for Team Leaders - prepared for hard work and able to work under pressure. Salaries are between £3,500 and £4,200 inclusive of allowance for Operators; up to £4,700 for Team Leaders.

2970 System Support

Essential experience is VME/B with particular emphasis on TP, IDMS and COMMS. This is an opportunity to be involved on the ground floor of this project; this implies a preparedness and determination to make the installation of the service successful. Salaries are between £4,500 and £6,500.

In addition to the above a bonus scheme is in operation, with a remuneration review in September.

There are real prospects of development and promotion for all levels of staff both inside the Operations/Support departments and outside with Sales/Support/Applications departments.

MOXON
DOLPHIN
& KERBY LTD
MANAGEMENT SELECTION

There is lots more to tell you about this exciting offer, so come along to meet us and have a drink and a chat.
If you can't make it telephone Jeff Parmenter on 01-836 1500 during normal office hours to make alternative arrangements.

Monday 31st July
Richmond Hill Hotel,
Richmond Hill,
Surrey.

Informal Interviews
8.00 AM - 8.00 PM.

Tuesday 1st August
Heathrow Hotel,
Bath Road,
Hounslow.

HARDYS (66/05) COMPUTER OPERATIONS RULE O.K!

We are a small select band of happy idiots who are finding life a bit lonely. If you are slightly or totally committed to insanity, you should give some proof that the HONEYWELL GCOS operating system is not completely alien to you. Alternatively, if you fancy joining us anyway, we could do with anyone who has been bewildered by a computer for about 6 months. The pay isn't bad: (£3,700 inc. for a senior operator and £3,200 for an operator); it's only 2 shift workings; there is some overtime for the more responsible element who may join us; we get 30p per day L.V.s and discount on various goods.

So if you feel we are the sort of people you are looking for, write, or if you prefer, telephone, giving a short résumé of career to date to:

Mrs. J. Ford, Personnel Manager
Hardy House, 112-114 High Street, CROYDON, Surrey
Tel: 01-886 4422 (Ext. 288)

SENIOR SYSTEMS ANALYST

(£5,970-£7,500 p.a.)

To supervise a specialist team developing T/P and batch systems in support of Radio broadcasting. We have two ICL 2980s operating under VME/B and experience of this range is preferred.

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Please telephone or write immediately, enclosing addressed envelope, for application form quoting reference 78 G 1485 CW, to Appointments Department, BBC, London W1A 1AA. Tel: 01-580 4488 Ext. 4819.



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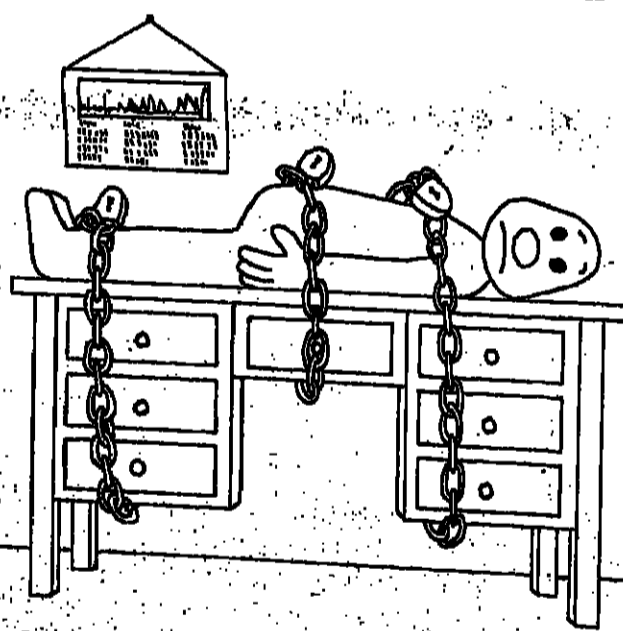
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Duncan Bransom Limited

Potters Bar Office
Hoval House, Mutton Lane,
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Telephone Potters Bar 44681

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The installation has an extensive range of applications in operations and a forward programme of work, including the development of a comprehensive on-line interactive information system, has recently been approved by the county council.

LOCATION: Shrewsbury, Shropshire.

Further details and application forms from The County Treasurer, Salop County Council, Shire Hall, Shrewsbury, Salop SY2 6ND, or telephone Mr. G. Matthews on 0743 2222 35.

Application forms to be returned by 11th August, 1978.

South Eastern
Health Board

KILKENNY, IRELAND

SENIOR
PROGRAMMER
(GRADE V)

The Health Board's data processing is based on an I.C.L. 2803 computer located in Kilkenny City.

The primary responsibilities of the job will be the supervision of the Board's programming activities and the maintenance and care of manufacturer supplied software.

The minimum requirements for the job are:

1. At least two years' experience in processing in COBOL using D.A.
2. Experience of the application of manufacturer's software.

Knowledge of structured programming techniques is highly desirable.

The post which is permanent and pensionable carries a salary scale of £5,180-£6,878.

Closing date for completed applications is Monday, 21st August, 1978.

Application forms and particulars may be obtained from:

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Arlene Slattery
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Kilkenny

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Minimum of 1 year's experience on a high IBM system is required. Starting salary, according to qualifications, experience, around £2,200 (inclusive of shift allowance and London allowance). We operate a three shift system covering Monday-Friday 08.00-18.00, Saturday 08.00-14.00, and Sunday 14.00-18.00. Please write giving details to: Yvonne Clark, Assistant Operations Supervisor, Computer Centre, University of London, 17-18, Gordon Street, London, WC1H 8AH, or telephone 01-387 0885.

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CSC

 Computer Sciences Company Ltd.

Network Applications Division

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You will work with a small highly qualified team specifying comprehensive interactive language capabilities for commercial users. Your recommendations will be implemented across a family of European minicomputers. Minimum experience is 6-8 years including work on user languages and user computer interfaces. Location: Holland

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You will be responsible for analysing data-flow and data access requirements for a very large on-line database distributed over multiple locations with an interconnecting communications network. Your design recommendations will lead to criteria for the choice of appropriate hardware and software. Practical experience in database design is essential and experience of proprietary packages is desirable. Location: London

Commercial Analyst £6,000—£7,000 (Ref. N8)

You will assist in the design and development of an on-line minicomputer based system to be installed for commercial applications in multiple European locations for a major international manufacturing organization. The minicomputers will be linked to IBM mainframes for background processing. Experience of on-line commercial applications essential. Location: London

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Please contact Sarah Oram at:
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market in Europe. He/she will also assume responsibility for sales training and support to the European sales forces.

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For further details and application forms, please contact: Mr. J. Barker, Systems Analyst, Brent Council, Brent Town Hall, Brentford, London W8 3TA. Tel: 01-894 2400.

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The Treasury
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£3,279-£4,632. Inclusive of Supp. Applicants should have completed a formal training course in COBOL and should preferably have a minimum of one year's programming experience. A working knowledge of PLAN would be an advantage. The successful candidate will work on a variety of projects and will be encouraged to widen his/her experience by assuming some responsibility for systems work. Suitable training will also be given towards obtaining the M.C.C. certificate in systems analysis. Starting salary will be according to experience. The installation is an ICL 1904T with 80K store and EDS facilities with a communication system. For further information, please contact Mr. J. Barker — St. Helens 0744 24061, Ext. 2305.

Written applications should be forwarded to the Treasury, Century House, Harrogate, West Yorkshire, HG1 1AA, by 7th August, 1978.

Helens METROPOLITAN BOROUGH

01-437 3043

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Computer Personnel Consultants

PROGRAMMER/ANALYST

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Ref. E2/2707

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The Company offers RELOCATION ASSISTANCE, FIVE WEEKS' HOLIDAY and an excellent starting salary.

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Ref. N1/2707

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Minimum two years' experience in IBM COBOL under DOS/VS.

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Faculty of Management and Information

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The successful candidate will join a small team based in Dublin which is actively engaged in developing on-line multi-user computer based medical systems. The team will be responsible for the design, development, testing and implementation of these systems. Applications in writing should reach the undersigned on or before the 15th August 1978. PERSONNEL OFFICER, Federated Dublin Voluntary Hospitals, 150, Grafton Street, Dublin 2, Ireland. An appointment will be made for interviews on London.

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Please write or phone: Personnel Department, Parivale-Gutermann Ltd., 22 Wadsworth Road, Greenford, Middlesex. Tel: 01-998 8000.

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We would expect candidates for this post to hold a degree or equivalent professional qualification and to have had 2-3 years' successful systems experience, but the only essential requirement is for them to be able to demonstrate a high degree of intelligence, enthusiasm and success.

For an application form or further details contact Jane Hughes, Personnel Recruitment Manager, Smith, Kline & French Laboratories Ltd., Mundells, Welwyn Garden City, Hertfordshire, AL7 1EY. Telephone: Welwyn Garden 25111, Ext. 26.

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Baric is Britain's biggest commercial bureau, its London (City and Eastern Counties) operation at Forest Gate runs a wide range of commercial applications on a 128K 1904A under George 3.

Our clients include major names in banking, insurance, broking and computing, using very large custom-built systems; in the middle range we have dial-up customers using remote VDUs, cluster terminals, and RJE's, from a wide variety of locations; and for numerous smaller businesses we run our standard packages—payroll, accounting, stock control, etc.

Our JD writing team, now depleted by promotions into programming and technical support, needs your contribution to designing, coding, testing and passing into production. Job Descriptions for our standard packages, for big custom-built systems, and for terminal customers' use.

If you have practical George 3 operating experience and a working knowledge of the George 3 Command Language, we can teach you how to design JD's (not just cobble them together) to produce really effective Production Jobs—Jobs which

are extremely reliable, very resilient (fast and foolproof recovery from system fail, very easy to use and control, almost idiot-proof, and efficient) in operation.

In addition to the money (£3,000-£4,000 depending on experience and capabilities) we offer the real job satisfaction of taking a design through from initial concept to regular production, and of working as one of a closely-knit group which operates as a team, supporting and covering for each other at all times—which is very necessary as we work flexi-hours.

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For more information please contact: Sean Lytton-Anderson, Support Manager, on ext. 185 between 9.00a.m. or 9.00p.m. any weekday, or John Bird, Section Leader, on ext. 280 between 8.00a.m. and 5.00p.m. any weekday.

01-634 6544. Or write to the former at: Baric Computing Services Limited, Unicorn House, 262 Romford Road, Forest Gate, London, E7.



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An exceptional vacancy occurs with a well-known British company who have several Queen's Awards for Industry to their credit. Located in North Surrey, the data centre houses an IBM 370/148, running under VM 370 — DOS/VS, POWER/VS, on which is processed a wide range of systems for a number of group companies.

It is anticipated that applicants will meet the following criteria:

- * Supervisory and man management ability
- * Minimum of five years' 360/370 experience
- * Good knowledge of DOS and POWER/VS and/or VM 370

This is an excellent career opportunity with a major company and, as one would expect, conditions of employment are first-class including four weeks' three days' holiday.

Applications for this position will be accepted until the end of August.

For further details and an application form please contact our CROYDON office quoting ref. CW 26-85.

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It is intended to recruit one of the best qualified Specialists available in the UK and the salary level, into five figures for the right candidate, will not be a barrier.

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Applicants must be able to demonstrate substantial and wide experience in the design of standard commercial applications for visible record and small disc-based business systems. This experience will certainly include at least five years with a Computer Manufacturer, ideally in an environment which has involved close liaison with Senior Sales and Marketing Management. Other benefits include Company Car, Pension, BUPA and re-location expenses where applicable.

Contact: MARGARET SYDES: 01-935 0671

Ref. CW/7/99

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The central systems team is responsible for developing group systems distributed to overseas D.P. centres. Major development plans include the introduction of a Database on IBM 370 mainframes and a network of IBM System 34 computers throughout Europe.

CHIEF PROGRAMMER

To £7500

The Chief Programmer will be responsible for project groups of programmers working on both 370 and System 34 projects. A good COBOL background is essential and a knowledge of Assembler and RPG II would be useful.

This position will be particularly attractive to those candidates able to demonstrate qualities of initiative and leadership who wish to advance their careers in a progressive environment.

ANALYST/PROGRAMMER (COBOL)

To £7000

The Analyst/Programmer, reporting directly to the Projects Manager, will hold responsibility for systems pertaining to the Africa area of the group operation. Candidates should have a sound COBOL background, along with the ability to liaise with line management and produce results with a minimum of supervision. The position will be attractive to persons with proven analysis experience OR programmers looking for an excellent opportunity to move into systems analysis. This position will require liaison with users in London and Paris; therefore candidates must be willing to undertake a limited amount of short duration travel.

ANALYST/PROGRAMMERS (RPG II)

To £6500

Two outstanding Analyst/Programmers are required to assist in the development of a number of very interesting Systems 34 projects. Candidates must have a sound background in RPG II and an ability to communicate with users at the highest levels of management. A certain amount of travel to Scotland, Holland and Norway is envisaged. The company has exciting plans for future projects in this area and successful candidates will enjoy a most satisfactory career progression.

Besides genuine career prospects, the company offers a non-contributory pension scheme, season-ticket loan, 12 and 4 weeks' holiday.

Ref. 81/2707

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EMI Analyst/ Programmer

At our Recording Designs Laboratories in Camberley we specialise in sophisticated electronic systems for underwater applications.

Due to continued expansion we are seeking to increase the size of our team of Analysts/Programmers. Applicants should ideally have real-time systems experience in a technical environment.

The successful candidate will be expected to design mini computer based software systems from either very broad customer requirements or from detailed mathematical specifications. He/she will then code, test and integrate the software with the applications hardware, at all times providing documentation to well defined standards. For individuals with the right motivation, a high degree of job satisfaction will be provided. The salary will be commensurate with experience and qualifications.

EMI Electronics Limited—Recording Designs Laboratories has an excellent working environment combined with a sound career structure and retains the flexibility of a small company working within a large Group. Promotion from within is the policy of the Company. Excellent Pension and Sick Leave Schemes are in operation. Four weeks annual holiday.

Write or telephone Camberley 26414 for an Application Form in the first instance to: Jenni Cozens, Personnel Officer, EMI ELECTRONICS LIMITED—RECORDING DESIGNS LABORATORIES, Victoria Avenue, Camberley, Surrey.

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If you possess experience in electronic switching development (software or hardware) or real time software design, plus reasonable knowledge of German (not required) we are eager to discuss this opportunity with you as soon as possible.

We are offering:

- a very attractive salary (up to DM 60,000 p.a.)
- a large range of fringe benefits
- assistance in integrating your family.

Find out further details by calling Mr. Brehme or Mr. Schewe from our personnel department under the number 01-2821234 (Hotel Cumberland) on Saturday, July 29th and Sunday, July 30th, from 9 a.m. to 5 p.m. or send a complete application to STANDARD ELEKTRIK LORENZ AG, Dept. CIS/PE, Attn: Mr. Schewe, BOB 400749, Germany, 7000 Stuttgart.

We are scheduling personnel interviews in London for shortly in the week thereafter.

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recently qualified science gradu-
ate with appropriate experience.
Salary on scale £2588-£3080 per
annum.
Please write to the Adminis-
trative Officer (Personnel) (Ref.
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Sheffield S10 2TN.

Chief Programmer

NW1 UP TO £8,000 p.a.

British Home Stores require a Chief Programmer for their Marylebone Road Head Office, to take control of a team of fifteen Application Programmers.

Apart from the day to day administration, other important aspects are to ensure that work is completed on time, and is technically sound, plus Recruitment and Training.

The successful applicant will also be expected to play a leading role in the implementation of improved programming techniques and interactive programme development.

The installation is a IBM 370/145, to which will shortly be added a 3031.

Ideally candidates will have at least five years programming experience in an IBM environment, using ASSEMBLER, COBOL and DL/1.

This position will attract people who wish to combine a future in application programming and management responsibilities.

Ref. CW 30/1

Systems Analysts

Dublin £6,000-£7,000 p.a.

Our client, a major company in the construction industry, requires Systems Analysts for a new project team being set up.

Applicants should have extensive systems experience and be able to demonstrate at least one successful system personally implemented. Experience in teleprocessing would be a considerable advantage as the company will be implementing a TP system using new hardware.

Excellent conditions are offered in this installation, covering a wide range of commercial, financial and technical systems. Assistance with relocation will be given where applicable.

Write or telephone Gerald Delamere in Dublin.

Ref. CW 30/4

Maintenance Programmers

Central London c. £5,500
IBM/RPG II

One of our clients based in London, wish to recruit Programmers with IBM programming experience in COBOL and or RPG II.

Working on a large variety of commercial applications from accounting to production control, they seek additional Programmers to support their current systems.

This is an opportunity for reasonably experienced Programmers to consolidate their programming to date and to build up their programming skills in an environment that does not demand specialist expertise.

Ref. CW 30/7

Consultants

Reading £6-£8,000 p.a.

A major international Software House require Consultants who have experience on Mainframe and Minis for their Reading office. You will be responsible for —

* Advising clients upon their future computing requirements.

* Ensuring that clients choose the hardware best suited to their need.

* Assessing the practical problems involved in implementing advance Computer Systems.

* Working with clients to ensure that systems are installed successfully.

Therefore we are looking for experienced Systems Analysts who have the confidence to advance into consultancy work, and who can communicate effectively with senior management. You should also have experience in either General Accounting, Production Control or Distribution.

Ref. CW 30/2

Programmers & Analysts

£4.5K - £8K

Consider the benefits of

- * Working in West London
- * Working on communications systems
- * Progression to project leadership
- * Variety of job contact
- * Programme development through VDU's

If you are a Programmer or an Analyst and have had exposure to commercial applications (on any hardware), our client would be very interested to learn more about you and discuss your future. They are a well-established software house and offer a career path based on real time earning above average salaries and large company benefits.

Projects are divided into small teams and there are many opportunities for men and women with management potential to gain experience in project leadership at a very early stage.

Ref. CW 30/5

Systems Consultants up to £7,500 + car Systems Engineers up to £7,000 + car

North & West London - Manchester

Exciting opportunities have arisen in a highly successful American corporation specialising in communications and information handling systems for high level support analysts.

Working in the nerve centre of a communications support team, successful candidates will be required to advise and trouble-shoot on our clients IBM Compatible Communications Hardware.

Excellent conditions of employment include travel in and out of the U.K., top relocations, expenses and financial aid for successful candidates with a background in Data Entry Systems, high level languages and a knowledge of a European language.

Ref. CW 30/8

The Irish subsidiary of a major multi-national company with offices in Dublin, wishes to recruit the following staff —

Analyst/Programmers

to work on the implementation of computer systems

Programmer

with good COBOL experience

Senior Operator

responsible for day-to-day operation.

An IBM System 3 Model 12 is in operation using COBOL on disc. Salary will be commensurate with experience and will reflect the importance which the company attaches to a smooth running and efficient DP department. Assistance with relocation expenses will be given where applicable.

Write or telephone Gerald Delamere in Dublin

Ref. CW 30/3

Banking & Mini Computers

Programmers up to £5K
Consultants up to £9K

The banking division of a major U.K. Systems House is looking for staff to meet the needs of their clients. Particular requirements are:

- * People with experience of banking systems ranging from programmers with 12 months' experience through to consultants with 7 years' plus experience.
- * Mini Computer specialists with 1-5 years' experience to join a team working on the applications software for international distributed processing systems. Knowledge of DEC computers or RTL2.
- * Programmers and Senior Programmers with experience of RPG.

This is an exciting opportunity to join a group which is growing rapidly and where the development of your career depends only on your abilities.

Ref. CW 30/6

Programmers & Analysts

up to £5,500 + car
NCR COBOL/NEAT 3 London

An exciting opportunity has developed for ambitious Programmers and Analysts to join a medium size, expanding computer company involved in automotive and finance industries.

Our clients computer operations are based on NCR Century 75, current plans include up-grading to a criterion: Developments in progress in an interactive on-line communications system using audio response equipment on a nationwide basis.

Programmers are currently required with one year's COBOL on the NCR 8000 series. Experience of IMQS would be advantageous, we also need Programmers with 18 months of NEAT 3 on Century machines.

Continental company growth based on development external customers systems guarantees excellent prospects for suitable employees.

Ref. CW 30/9

Central Computing Consultants

KINGSTON: 44 Wood Street, Kingston upon Thames, Surrey, England. Telephone 01-549 3212 Telex 27950
DUBLIN: Canberra House, 24 Lower Leeson Street, Dublin 2. Telephone 789577 (5 Lines)

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GHANA SYSTEMS MANAGER

Ashanti Goldfields Corporation (Ghana) Ltd.

Applications are invited for a Systems Manager with in-depth knowledge and extensive practical experience of Systems Design and Programming in Plant for Disk and T.C.L. 1901 Driver. This appointment will involve:

- Preparation of detailed systems and programming specifications
- Guidance, advice and counsel to programming staff
- Training of local staff in practical systems design and analysis

The installation comprises an I.C.L. 1901T Computer, 48K, with E.D.S. 60 and local visual display terminals with terminals. The successful applicant will head the project to redesign existing magnetic tape systems to operate effectively in a disk and communications environment. Ideally, past experience will have been gained in a small installation where the applicant has been fully involved at all stages of the systems, programming and operational implementation. Experience of working overseas and possession of formal computing qualifications will be an advantage.

Starting salary about £11,000 p.a. (equivalent) at present rate of exchange.

Conditions of service are in line with modern thinking and include:

- 5 year contract
- 15 month foreign tour with 3 months' leave
- Free furnished accommodation
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Cheapside House, 138 Cheapside, London, EC2V 6BL.

**UNIVERSITY OF SALFORD
COMPUTING LABORATORY**

Applications are invited for two senior posts in the User Services Section of the Computing Laboratory.

ASSISTANT DIRECTOR
(Head of User Services)
CL/63/CW 17074-12730

**SENIOR
COMPUTING OFFICER**
(User Services)
CL/64/CW 12954-12308

The group is responsible for the provision of applications software documentation and user support within the Laboratory. Applicants for both posts should have a good honours degree and several years experience in an area of computing relevant to the work of the section.

Further particulars and application forms may be obtained from The Registrar, Salford University, Salford M5 4WT, and should be returned by 21 August, 1978, quoting appropriate reference.

**QUEEN MARY COLLEGE
University of London**

**ELECTRICAL AND ELECTRONIC
ENGINEERING DEPARTMENT**

Applications are invited for the post of

**COMPUTER
PROGRAMMER**

This appointment offers opportunity to develop various skills and is in the development and maintenance of programs supporting research and teaching using University, College and Departmental computers. Applicants should have a Science or Engineering degree with programming experience (preferably FORTRAN) and possess an assembler code. Appointment for 3 years in first instance, on scale £1180-£2282 p.a. (under review), plus £450 London Allowance. Please apply enclosing curriculum vitae and names of two referees, to The Registrar (CWR), Queen Mary College, Mile End Road, London E1 4NS, not later than 11 August.

Computer Operator....

...who wants to be a Programmer

This is your opportunity not only to be trained as a Programmer, but also to work for an international oil exploration and production company, which is expanding rapidly in the U.K.

Initially you will operate a Datapoint 6600 computer terminal, including graph plotter and digitizer, which is on line to an IBM 370 mainframe. Because you must be able to take responsibility for running the system unaided for much of the time, you will need up to a year's experience as a computer operator. The position is on a two shift basis.

We will offer a very attractive salary with top class benefits. The right man or woman will receive training as a Programmer, so career prospects are excellent.

Please phone for further details and an application form, or write to:

Tania Edwards or Howard Statham
Marathon International Petroleum (GB) Ltd.
Pan Ocean Oil Corporation
35/38 Portman Square, London W1H 0BN
Tel: 01-935 3713



Systems Analysts to £5,500

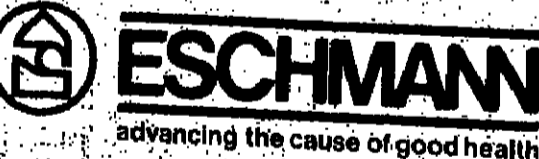
On-Line Developments - Sussex Coast

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Our existing computer (ICL 1901T) plays a vital role in the planning and transaction of the company's business, and proposals are in hand for the significant extension of its influence, particularly in the manufacturing area. Plans are also at an advanced stage for the up-grading of the current equipment to a 2904, Model 50, with a firm commitment to On-Line working.

Opportunities are provided for suitably experienced personnel to contribute to these challenging developments in a relatively small and friendly company that enjoys large company benefits, e.g. - Annual profit sharing bonus - Generous relocation expenses where appropriate - Pension and sick pay schemes.

Details and application forms are available by telephoning or writing to: Personnel Officer, Eschmann Bros. & Welsh Limited, Commerce Way, Lancing, West Sussex BN16 8UP. Tel: Lancing (09083) 62281, ext. 37.



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advancing the cause of good health

PROGRAMMER

Applications are invited for the above post in the School of Computing Studies to take effect from 1 October, 1978. The successful applicant will be responsible for providing programming and general computing support to members of the academic staff in the School. Preference will be given to candidates holding a degree in Computing or having appropriate professional qualifications.

Appointment will be to the scale £3189 to £5282 (under review) plus USS benefits. Applications must be sent together with the name and address of three referees to the Registrar, School of Computing Studies, University of East Anglia, Norwich NR4 7TJ, from whom further particulars may be obtained, not later than 11 August, 1978. No forms of application are used.

**COTSWOLD DISTRICT COUNCIL
COMPUTER
OPERATOR**

Salary: Scale rising to £3,276 p.a. (minimum payable at age 21 - £2,850)

The Council requires a Computer Operator to work in its computer installation in Goodrich Street, Cirencester. Installed is a 32K Honeywell 2020 with tape and disc systems and with MCR operating system. Previous operating experience is essential. Previous experience on Honeywell machines, though desirable, will not be provided. The installation is run on a one shift day and a system of flexible working hours is in operation.

Application forms are available from the Director of Finance, 11 Goodrich Street, Cirencester, Glos. (Telephone Cirencester 5181, Ext. 272) and further details can be obtained from Mr. Butler (Ext. 274) or Mr. Morgan (Ext. 271) on Cirencester 5181. Closing date - noon on Friday, 4th August, 1978.

George 3 Specialist


Melbourne, Australia

A\$13,000-
\$16,000

An opportunity exists for a George 3 specialist, who has preferably had some experience in a sales support role. Your specialist knowledge will be utilised in supporting 1900 and 2900 George 3 sites of which there are currently six in ICL Australia's Southern Region. You will work at a detailed technical level and from time to time will be required to use your dump-cracking ability. You will also provide general systems support to a group of users in the solution of day to day software problems.

This is a permanent position and assistance with relocation will be given.

If the wide horizons we can offer in Australia attract you and you can meet our requirements, then write without delay to Carole Hudson, ICL Bridge House North, Putney Bridge, London SW6 3JX, quoting reference CW1941, (Tel: 01-788 7272 ext 2047).



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World-wide manufacturer and Distributive Group seek a Systems and Programming Supervisor to head a small team responsible for the review, design and development of U.K. group systems to interface with the International D.P. Network. Ideally candidate will have experience of Burroughs Hardware but enquiries are invited from persons with similar responsibilities seeking new horizons.

YOUNG AND WANT TO GO PLACES SUCH AS OVERSEAS?

A leading, independent Computer Consultancy is offering a number of opportunities to Programmers with at least 2 years' R.P.G. II experience, to join their expanding, specialised organisation.

Initially you will be based in the U.K. to become familiar with the organisation and thereafter the opportunity will be given to work in their various offices abroad. Salary £5,000 to £6,000 p.a.

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Private trading company wishes to increase their D.P. department and are currently seeking two programmers with between one and two years' experience of PL/1.

The present system is an IBM 370/115 under Power VS, with Shadow as the TP monitor to a 3741 in New York. First-class fringe benefits include financial assistance in House Purchase, interest-free season ticket loans and £1 LVs per day.

For further details please phone Steven Morton on 01-637 0781 or alternatively write to ATA COMPUTER RECRUITMENT, 230 Gt. Portland Street, LONDON W1N 5HG.

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Programmers with a minimum of 12 months' experience gained preferably in a commercial environment to work on Systems development.

Promotion by merit - locations: BRISTOL, BATH, POOLE, PLYMOUTH and CENTRAL DORSET.

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Woolworth Building, 102 New St.
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Applications include financial, insurance and insurance building society, holidays, wages, etc.

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Requests for application forms and further information should be sent to:

The General Secretary, National and Local Government Officers' Association, 1, Watlington Place, London WC1H 8AU.

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LONDON, JULY 27th

To arrange a confidential interview send resume immediately, or 24th (reverse charges accepted).

**L. Levine, Royal Lancaster Hotel, Lancaster Terrace, London W2
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COMPUTER PROGRAMMER

Boston Division of UOP Limited is the world's leading manufacturer of suspension seating for the truck, tractor and industrial equipment markets.

We are currently seeking an experienced programmer to join our small, but expanding D.P. installation, which utilises an IBM System 3, Model 12.

The successful applicant will have a minimum of two years' programming experience, using RPG II, and will probably have worked in a manufacturing environment.

Compensating salary will be dependent upon age and experience, and the company offers a wide range of benefits, including 28 days' annual holiday and contributory pension scheme with free life assurance benefit.

Please write or telephone for an application form to Mrs. P. Cowgill at the address below:

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11 Watford Road, Watford, Herts.
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Unlimited territory for a very rare species

Database Specialists to £10,000 plus car

A leading company needed a nationwide computer system — to be developed from scratch to handle its entire sales, service, spare parts and accounting functions. Perhaps a network of ten dispersed minicomputers would provide the most economic solution. Perhaps more than twenty. Could you evaluate a requirement like that? Or design the distributed database?

One of the country's fastest growing insurance companies required an online database system to cover all aspects of its business. Could you design a highly complex database containing 1500 Mbytes of data? Or solve the recovery problems inherent in online access to such data volumes? Could you design the transaction processing monitor? Or

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Data Logic is looking for consultants and system designers for these and similar projects. Current assignments include work for banking, manufacturing and distribution, and public sector organisations. Technically, the scope of work should give unlimited opportunities to the right people.

The experience and personal qualities we need are extremely rare. Preferably, candidates will have a degree in computing science or a relevant discipline. They will have spent at least five years on the design and implementation of database management systems — on minis or mainframes. Ideally this will have been with a computer manufacturer or a software product company, although work with a software house or a major user of an online database system will also be of interest.

Candidates will have the ability to work with a minimum of supervision, and to deal effectively with senior management in client companies. Detailed knowledge of one of the following will be a distinct advantage: IMS/PLI, TOTAL, DMS2, IDMS, IDS, ADABAS.

We know we are asking a great deal. In return we offer a salary of up to £10,000 p.a., a share in the profits of the country's most profitable software company, contributory pension scheme and a company car.

Why not call or write to arrange an informal meeting? We would like the opportunity to describe the challenges and rewards of working for Data Logic. And you'd probably like it confirmed that you are as rare as you think.

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Call or write: W. D. Barrow, Data Logic Limited, FREEPOST, Westway House, 320 Ruislip Road East, Greenford, Middlesex UB6 8BR. Telephone 01-678 9111



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Sales Executives (NEW PRODUCTS)

Area Sales Engineer

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RACAL

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To join the new division marketing computer controlled voice response systems for data entry and file enquiry applications.

Applications are sought with proven sales ability and familiarity with data processing, consultancy, bureaux or hardware software. Positions will be based in either the Reading or Manchester offices.

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To operate in the South East from the Reading headquarters of the highly successful UK Sales team, selling Data Communications equipment to computer-based users.

Preference will be given to applicants with direct selling experience in data processing, Communications or electronics.

All sales positions carry attractive base salaries plus generous commission and company cars.

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To join the Engineering Group giving product support to the UK Sales Team.

Degree, HNC qualifications are expected plus experience in design and development using digital and analogue techniques. Direct experience in Data Communications and competence in software at assembler level would be an advantage.

A competitive salary commensurate with experience and ability will be paid.

The Company offers nearly five weeks annual leave and membership of a first class contributory pension scheme with free life assurance.

Applications (male or female) should write with details of age, qualifications and experience, to: D J Kitchenside, Personnel Officer, Racal-Milgo Limited, Prospect House, Thorn Street, Reading, Berks.

Western Europe Software Holland £8,500 - £16,000

We are actively recruiting programmers, analyst programmers, Consultants and Senior Consultants for career appointments in Western Holland. The environment you will encounter is one where high quality software design and implementation is essential, and it is important you wish to be leader in its field and expansion planned is considerable throughout Western Europe. We are particularly interested in career-minded people who have had experience in an on-line, real-time environment, or switching or networks using mini-computer based systems. Projects you will encounter will be extremely varied, often extensive and usually sophisticated. Successful candidates can expect a competitive continental salary (generous tax concessions can also be applied for), interesting and worthwhile job content, excellent conditions of employment and benefits associated with a prestige company.

Telephone me, Bill Seymour, for further details; interviews with our client will take place in London during the first half of August.

Bill Seymour 01-637 5001

U.K. Office, Portland House, 4 St. Portland St., London W1N 5AA
Andrew Ellis, Sarphatistraat 30, Amsterdam, Holland, Tel. (020) 264864

Accord Computer Efficiency

The Dynamics Group of British Aerospace has evolved from the best expertise and engineering knowledge being applied in this country to the design, development and manufacture of guided weapons. One of the spin-offs of our work in this field is the ability to produce Automatic Test Equipment (ATE) of the highest standard. To help us to continue our expansion programme, we are looking for people of various disciplines to work on ATE.

Group Leader - Programming Systems

The Software Facilities Department of our Automatic Test Systems Group has as its main functions the provision, maintenance, enhancement and operation of the software management and data-handling facilities required to support the generation of application and self-test software for Automatic Test Equipment. This involves compilers, editors, emulators, translators, and a dynamic management and data-handling system to serve the needs of the ATE Engineering Department.

Within the Department, we have a vacancy for a Group Leader to be responsible for two teams of Programmers, one working principally in Cobol on an IBM 370/158, the other on mini- and micro-computers in Assembler and Coral.

Candidates should have varied experience and be competent in both project and man management. In addition, ability to understand an end-user's needs will be useful.

Software Systems - Microprocessors

Weapon systems use digital processing power and, with the advent of the micro-computer, this use will extend and the applications will become more complicated in the search for improved performance. The systems will use mini-computers and micro-computers involving distributed processing, real-time, multi-processor and multi-tasking technologies, with full high-level language and host computer support.

We need software system engineers/consultants to assist our Engineering Teams in tackling a whole new range of problems in the system design, assessment and test areas arising from the move from analogue to digital systems. Your background will be in Control Engineering, Electronic Engineering or Computing Science, to graduate standard, and you will have experience with mini-computers or micro-computers, including programming in a high-level language (preferably Coral).

Automatic Test Equipment

We have vacancies for people who can design and develop electronic test equipment, generate the technical requirements for test sets and analyse the associated documentation, and then verify the integrity of the test package. There are also vacancies for similar people to work on mechanically orientated test equipment.

We require software people who are used to solving test engineering problems and who wish to apply their expertise to programming ATE and also people with experience in developing system software with an application in solving engineering problems. If you are familiar with any of the following, you could work on our executive software: Systems analysis, High-level language compilers, Assembler language, and Disc operating systems.

The salaries offered will reflect the importance of the position. Interested candidates are asked to send their career details or write for an application form to:

Mr. P. C. Ellinger
Ref: A511, Personnel and Training Dept., Site A
British Aerospace Dynamics Group
Stevenage-Bristol Division
Six Hill Way
Stevenage, Herts, SG1 2DA
Telephone Stevenage 2422, Ext. 3129

BRITISH AEROSPACE
DYNAMICS GROUP
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WORLD SHORTAGE OF PROGRAMMERS

We need several more programmers to help us keep our lead in the World Processor market. We design and write assembly code programs for 8080 and Z-80 microprocessors. You can have any job title you like (except, perhaps, Director), provided you can write code and make it work.

Experience of microprocessors would be useful - but isn't essential. We prefer working with graduates - or at least people of an equivalent standard. The main qualification is, however, the ability to produce useful programs from a minimum of specification - after all, if we tell you exactly what to do we might as well write the code ourselves!

If you want to know more about working for this small company in sunny Dorking, then ring Chris on Dorking (0308) 87789.

DATA RECALL LTD.

Windsor House, Dorking, Surrey



JUNIOR PROGRAMMERS

c. £4000 p.a.

I.B.M. 370, 138, DOS-VS, CICS, SPMOL

The Computer Services Department at the Royal Borough of Kensington and Chelsea was formed during 1977. An opportunity now exists for two Junior Programmers willing to develop their programming careers in a progressive systems development environment, utilising the latest computer facilities and proven standards.

The Junior Programmers will be working in a project team environment, coding and testing programs in COBOL and possibly RPG II.

Applicants should have received basic training in programming and have gained at least 8 months' COBOL programming experience.

THE ROYAL BOROUGH OF KENSINGTON AND CHELSEA

Application form quoting Ref. CW/662 from the Establishment Officer, Department 151, The Town Hall, Horton Street, London W8 7NK. Tel. 01-837 8962 (24-hour answering service). Application form to be returned by 14th August 1978.

SENIOR OPERATORS Salary package to £5790 + mortgage + + JUNIOR OPERATORS Salary package to £4250 + mortgage + +

Our client, a major American Bank based in London, is expanding its operations staff to cope with increasing workloads and new hardware. They operate an IBM 370 using POWER and CICS plus multiple PDP 11s for a variety of communications applications.

Applicants for the Senior vacancies must have a minimum of 2 years' experience on either IBM or PDP equipment and 12 months is the minimum for the Junior positions. If you have knowledge of both types of equipment, then you may qualify for a higher salary than that quoted.

In addition to the excellent salaries the positions also carry considerable additional benefits including free lunches, season ticket loans, non-contributory pensions with subsidised mortgages and cheap personal loans after a qualifying period.

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LEEDS BASIC + PROGRAMMER

To £4,500
Progressive installation requires BASIC + programmer for its PDP-11 hardware linked to IBM mainframe. Would suit a programmer with aspirations towards analyst/programmer.

YORK PROGRAMMERS

from £4,200
York based company has vacancies for COBOL programmers with minimum 12 months' experience - regardless of hardware. For these vacancies salaries range from £4,200 according to experience.

SOUTH BRADFORD SYSTEMS

ANALYST to £6,000
An expanding bureau has a vacancy for a broadly experienced systems analyst to work on in-house/customer situations. If you wish to gain more general experience then you should learn more about this position.

SOUTH BRADFORD BUSINESS

ANALYST £5,500
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LEEDS PAYROLL SYSTEMS

£5,000
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£67,000
Our client is forming a DP consultancy group within its already established service organisation. Positions of challenge and opportunity available for experienced DP professionals.

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Simply ring LEN CRAY or write to our Leeds office. Interviews can be arranged to suit you.

"If you're considering a move then you should contact Len first".

LORIEN COMPUTER SERVICES



SYSTEMS ANALYST/PROGRAMMERS

required urgently

Leading Transport Management Services Group requires experienced and motivated people for contracts in Europe and elsewhere. German/Dutch speaking capability is useful.

Please write for a confidential brochure to: D. K. Wright, Organisation 27 Stamford New Road, Altrincham, Manchester.

Also offices in London, Birmingham, Amsterdam & Toronto.

NORTH STAFFORDSHIRE POLYTECHNIC

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2. Computer Archaeology - development of graphics, data capture systems and associated interfaces.
3. Microprocessor systems development.

Salary: £2727 per annum including supplements.

A second post is available in one of the above areas for which a Science Research Council Studentship is available.

Further details and application forms are available from the Establishment Officer, North Staffordshire Polytechnic, College Road, Stoke-on-Trent ST4 2DE.

RPG II PROGRAMMER/ PROGRAMMER ANALYST

for the post of

DEPUTY DP MANAGER to £7,300 NORTH LONDON

Our Clients, the largest manufacturers and distributors of musical instruments in Europe, are looking for a Deputy Manager for their ICL 2904 computer department. In this post you will manage a small team of programmers and will be expected to take over the day-to-day running of the department in the absence of the Manager. You will naturally liaise closely with the Data Processing Manager, helping to define systems specifications and laying down long term plans and budgets.

The Group are about to develop two major systems:

- ★ An on-line order processing system including invoicing, sales forecasting, re-ordering, etc. This system, which at present is limited to local VDUs, will shortly be enhanced to support remote locations.
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For this important position of Deputy DP Manager, you should be experienced in RPG II and ideally have the following attributes:

- ★ The ability to lead a team of programmers.
- ★ Detailed knowledge of at least one commercial system.
- ★ Have written program specifications and probably designed programming standards.
- ★ The ability to communicate with management.

Here is an ideal opportunity for an experienced programmer to take a management role in an expanding computer department whose offices are located in an extremely pleasant residential area in the North of London. The Company offers all normal benefits associated with a large organisation.

Ref. CW/47/1

Should this position interest you, please phone ROY HIGHFIELD, Advising Consultant, for further details or preferably to arrange an interview.

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HUTTON HOUSE
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TELEPHONE 01-353 7141 (24 HOURS)

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SYSTEMS SUPPORT ANALYSTS CIRCA £6,000 + BONUS COMPANY CAR

We are looking for ambitious men or women with a wish to work in a sales environment. You should have experience in ASSEMBLER, COBOL or FORTRAN. Knowledge of operating systems and a general hardware understanding. You will be at present working in a user environment or with a manufacturer and be looking for a more challenging career and exposure to customers.

TECHNICAL SUPPORT ANALYSTS CIRCA £7,000 + BONUS COMPANY CAR

This particular post will be of interest to experience computer or peripheral engineers looking to widen their experience. You will be expected to provide technical guidance to field engineering staff, solving the more complex maintenance problems, trouble-shooting and being involved with on-job training. You will also be expected to maintain a specialised knowledge of the company's products.

Ref. CW/47/2

Applications will be treated with the strictest confidence and should be made to ROY HIGHFIELD, Advising Consultant.

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WHO IS CONTROL DATA?

WE are a computer company employing 41,000 people worldwide.

WE have a firm commitment to the computer industry, the United Kingdom and the training and advancement of people.

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WE offer a challenging and rewarding career opportunity with involvement in software development, installation and support, together with some sales-related activities in the areas of system configuration and benchmarking.

WE are looking for technical people of the highest calibre and offer salaries and associated benefits commensurate with the demands of the post.

If you have the qualities and experience we are seeking - please read on.

WHO ARE YOU?

YOU will be intelligent, enthusiastic, articulate and self-motivated.

YOU will be at least 25 years' old with several years' systems software experience. A knowledge of Control Data's Cyber 170 operating systems, particularly NOS/BE, would be advantageous.

YOU may have a degree in computer science but more essential is a sound knowledge of operating systems, the ability to quickly comprehend new concepts and to communicate with customers.

YOU may expect the possibility of travel in the U.K. and Europe.

Please write to Mrs. Margaret Spence with full details of your career to date. Professional Services Division, Control Data Ltd., 22a St. James's Square, London, S.W.1. Telephone 01-930 7344.



MORE THAN A COMPUTER COMPANY

هذا من اجل

BASIC PROGRAMMER/ANALYST—£5K PLUS

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There are six of us at present, and we work in APL and BASIC on timesharing systems and minis. Clients range from small businesses buying their first computer to multi-nationals with interactive systems accessed from all over the world.

If you need responsibility, and variety, and enjoy an informal environment, call

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COURSES



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Substantially qualified candidates can enter directly on to the second year of the Part I course.

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HIGHER NATIONAL DIPLOMA IN COMPUTER STUDIES (Borough and Full-time)

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Application forms for the H.N.D. Course available from City of Birmingham Polytechnic, Franchise Street, Birmingham B4 7DS.

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Computer Weekly, the leading U.K. and European computer publication, and a major publication of IPC Business Press, has an opportunity for a Senior Advertisement Space Salesman / woman. Applicants should have a proven selling record and be used to dealing with clients at senior level. He/she will work with an enthusiastic team of self starters, and will be responsible for an important, lucrative area. Some travel in Europe necessary. Excellent salary, bonus incentive scheme, company car and usual large company benefits.

Applications to:

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INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, AUSTRIA

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for an IBM 370/168 (MVS, CICS/STAIRS, TP)

Good educational background and at least two years' operating experience on a multiprocessing medium- to large-scale computer required. Shift work. Tax-free salary, six weeks leave per year, travel and removal expenses paid, non-resident's allowance, installation grant and, if applicable, dependency allowance.

Send curriculum vitae to Division of Personnel, International Atomic Energy Agency, P.O. Box 590, A-1011 Vienna, Austria, not later than three weeks from today.

Systems Analyst

Oil exploration

£8000

Tricentral Limited is a British company exploring world-wide for oil, gas and minerals. Production outside North America is controlled by Tricentral Oil Corporation which, since the Thistle Field in the North Sea came on stream earlier this year, is not only expanding its exploration but also making increasing use of its computer facilities.

Tricentral Oil Corporation needs a systems analyst experienced in Tabul and Fortran on Honeywell Mark III time sharing systems with a knowledge of Basic using IBM Cell 360 systems for the following applications:

- financial and cost accounting
- exploration economics
- forecasting

Graduate preferred. Age is less important than communicative skills and speed of reaction to the demands made on a young, small but growing department.

Location London. Salary negotiable around £8000.

Please write in confidence for a job description and an application form to: David Prosser, Executive Selection Division, Southwark Towers, 82 London Bridge Street, London SE1 1SY, quoting MCS/3705.

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Data Prep Programmer with at least two years' experience to work with a leading English Mail Order company and liaise with its French office on a variety of projects. Good salary and opportunity for advancement in a growing company. Write in confidence with details of experience to date to: *Leopold Joseph, Managing Director, L'Esprit Arts Ltd, 78 St. James's Crescent, London SW1A.*

THE SALES BIT

PROSPECTING (3)

The protective secretary

ONE of the natural hazards of establishing contact with a new business prospect is the "protective" secretary. "Mr Prospect is in a meeting at the moment" must be a familiar cry to many a salesman.

The immediate reaction of most salesmen is to think of ways around this material obstacle. I have seen salesmen driven to desperate actions by the sheer frustration of finding all normal methods of communication blocked: disguised voices, knocking homebound buyers, and so on. One can only admire the determination and ingenuity of such efforts, but often they become necessary through lack of subtlety and common sense from the outset.

The attitude of the salesmen towards secretaries is particularly important in this context. Secretaries are not the chattels of their masters; they are people performing an essential secretarial function. Many are in the job because they have decided upon a business career rather than a domestic one, and as such are typically very independent ladies who respond badly to male chauvinism. Therefore, any hint of patronisation, arrogance, condescension, flattery, or chatting-up techniques, is bound to introduce communicative barriers. If the salesman starts out by attempting to work with the prospect's secretary rather than getting past her, he will ultimately have fewer problems.

The first stage is to discover the secretary's full name, while remembering to use only her surname in the first instance. The salesman needs to show respect in order to gain it, and christian-name mode with a stranger is never advantageous.

Having discovered who the secretary is and how to address her, the next step is to recruit her assistance and the best way to do that is to ask for it. Obviously, the only help the salesman really needs at the outset is to be put through to the prospect, but if this results in resistance only then the salesman needs to become involved in more specific reasons why the secretary should help him meet her boss.

Often, by simply stating his situation and a need for assistance, while stating an appreciation of the secretary's responsibilities, the salesman can achieve positive results.

For instance: "I am sure Mr Prospect is constantly approached by salesmen wishing to sell to your company, and he doesn't have time to see them all. I realise it is part of your job to help him select those salesmen whose products could bring most benefit to your company."

"The computer system I need to discuss with him is not only bringing significant benefits to some of your competitors, but is also closely allied to company policy and only he could decide the validity of the advantages involved."

"Is it easier to contact him at the beginning or the end of the week? Does he tend to be more readily available in the morning, or the afternoon?"

In other words, the salesman should make the secretary realise that he appreciates her importance while at the same time introducing a decision criterion outside her scope, thus demanding the involvement of the prospect which in turn should require a meeting. Company policy and competition are useful devices in this context, and an "optimal close" on the best time to call does no harm at all.

Having said that, it is clearly better for the salesman not to get involved with the prospect's secretary other than at the courtesy level.

Often the manner of the salesman's approach can get him straight through to the prospect without any resistance from his secretary. It is, therefore, important that his attitude is bold without being familiar, thus suggesting an existing business relationship between the prospect and himself.

Of course, the salesman cannot be sure that the prospect will be in the office when he calls. In this situation it is best to ring off, after establishing the best time to call again, avoiding any further discussion with the secretary.

In his eagerness to sell he might just sell himself out of a reason for calling again.

TRADER

Survey of 100 US word processors

AN exhaustive survey of over 100 different word processors is available in a 70-page booklet from Computer Information Services, London. Called "All about Word Processors," it costs £10 and is a selection from Datapro's "Manual of Word Processing" looseleaf information service.

The full manual costs £200 plus £200 a year for its monthly updating service. Only word processors available in the US are covered. CIS is based at 288 Pentonville Road, NI.

PC brochure

AN illustrated brochure on printed circuit systems has been published by Ferranti Catec Graphics. It describes the specialised equipment developed and produced by Ferranti for manufacturing artwork needed for printed circuit production. Copies are available from Technical Sales Office, Ferranti Catec Graphics Ltd, Ferry Road, Edinburgh, EH5 2XS.

Puzzle answer

THE message is: "The K's tour with one call only upon each square has long been a source of fun for chess fans when not able to visit their clubs. At first it may seem hard by any route at all, but when a way is found by one whose maths is good, 'The' is 1 and '260' is 84, and all eight files will total 260."

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Application forms and job descriptions from the Administration Manager, Room 708, Brent House, High Road, Wembley, Middlesex, returnable 3rd August, 1978. Telephone 01-903 0371 (24-hour Answerphone service). Reference number F/48/D must be quoted.

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Ascii through the
Logic Gate

An epic in 32K words, by Richard Forsyth

Block 8 (Block Mode Transfer)

Hex and Cleo have slipped into the research centre at Sun Guine, persuaded Lambda and Zap to work with them and slipped out again unobserved. At the hush where their getaway motorbike is hidden, however, they are confronted by its irate rightful owner, with two law enforcement robots.

HEX took one look at the armed robots. "We surrender," he said. "Don't shoot." He didn't want Asci to make a suicidal attempt at resistance; but Asci had already disappeared into the thicket.

"Come with us," commanded James Hock. They followed him to the main gate. There a sentry challenged him.

"I have come to turn these criminals over to your security service," said Hock. "They stole my motorbike. The girl is a human and I suspect the android is some sort of drop-out."

Before the guard could reply an imposing figure strode towards them. It was Zap. "Mr Hock, I presume," he said. "I understand you've had some trouble with these two ronegades."

"Quite so," replied Hock. "They assaulted me and left me by the roadside. I want to report them to your security officer."

"I am acting chief security officer," said Zap, flourishing his ID-card authoritatively. "I'll take charge of them personally. These are not just common thieves; they are suspected of belonging to the Hexadecimal Kid's terrorist gang. You may not be aware that a substantial reward is on offer for information leading to their arrest. The System will be indebted to you."

Hock beamed. "I'm not called Add Hock for nothing."

"What are you called Add Hock for?" inquired Cleo.

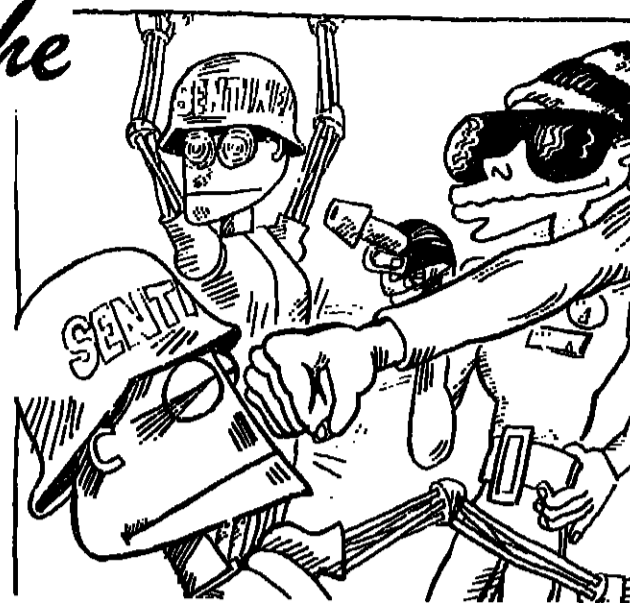
"Because I can put two and two together, stupid," he retorted.

Cleo decided no further comment was necessary.

"Now," put in Zap, "I'm afraid we'll have to take the motorbike in for forensic tests. You can, of course, stay here, at least until some transport can be arranged."

"That's very hospitable," replied Hock. "As it happens I was on my way to give a demonstration of my word-

processing package to your software manager, but as these



hooligans tore up my source listings I'll need a while to make it presentable again."

"Fine, then, just follow me," said Zap, and added to the law enforcement robots: "You can go now, thank you, we'll handle this ourselves."

Hex hardly dared sneak a glance over his shoulder to see if they had obeyed Zap's order. Sure enough, there they were, trotting obediently into the distance.

Once inside the main building Zap put his arm round Hock's shoulder and began chatting expansively about the virtues of the PUFTA system, about which he appeared quite well informed. They quickly reached Floor D and made their way to what Hex seemed to recall was Lambda's door. Zap unlocked it and ushered him in. "This is your overnight accommodation. I hope you find it comfortable. If you need anything, just request it on the viewdata terminal. Now excuse me for a moment: I must deliver these two to the basement cells for interrogation." He bade Hock goodnight and shut the door.

"Easy does it," whispered Zap as they walked back to the lift.

Lambda was waiting for them in the foyer. All four of them marched out together. Hex noticed that Zap had unfastened his holster and drawn out a terminator, which he brandished menacingly in Hex's direction.

"Any trouble from you?" he called out loud enough for the sentries to hear as they approached the gate, "and you'll both get zapped."

Both guards stood out to check their progress. "Orders to take these prisoners to Galactic Headquarters," explained Zap, pre-empting their questions.

"Whose orders?"

"My orders," replied Zap, pointing his terminator directly at the questioner.

The other sentry moved fast, but not as fast as Hex who grabbed his blast-gun and stuck five digits in his interface before he could fire. Seeing this, the first one dropped his blaster and raised his hands in the air. They hustled him through the gateway.

"Where's the bike?" asked Zap.

"Follow me," replied Hex.

When they got there, Asci, who had eluded Hock's searchlight and laid low since their capture, was still waiting. They tied up the sentry and put Cleo and Lambda on the motorcycle.

"We'll go on foot," said Hex, "and meet you at the inter-block gap. Take care."

"See you soon," called Cleo as the machine spluttered into motion.

Hex, Zap and Asci jogged cross-country through the night. They hadn't much time, or breath, for conversation, but in the middle of the night Zap asked, "Do you think they let us get away?" to which Hex had no reply. Reflecting on it, though, he did think it had gone just a bit too easily.

By morning they were high up once more in the Sierra Nueva. They arrived before the girls and Hex led Zap down the secret tunnel. The last few metres, however, were blocked by an earthfall. Asci dug, while Hex and Zap ferried stones laboriously up to the surface, to clear a passage. When they finally broke through, Hex was unprepared for what he saw.

The carpet of green moss had turned red; the tree by what had been the pond was just a charred black stump like an outside mutchstick, and the pool itself was no more than a muddy brown puddle. Hex turned to Zap. "This place has been bombed while we were away."

Zap glanced at the rock walls of the crater which were glazed like porcelain, confirming Hex's surmise. "They must have used psycho-logic to predict your movements. There's enough data on you in the Database for them to work out an extrapolation formula. The only question is: why were they late?"

"That's just it," said Hex. "Cleo persuaded me to leave early. They obviously haven't got her on file."

"And they obviously didn't expect an android to change his plans for a mere human," replied Zap with a mischievous smile.

"I hope she gets back soon," was Hex's response.

Were they wise to leave Cleo and Lambda to fend for themselves? No.

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BOOKS

Entertaining writing
about computers

Tales from the computer room, by John Race. 44pp. 65p plus 10p post and packing. Brunel University Bookshop, Kingston Lane, Hillingdon, Tel: Uxbridge (89) 37188.

THERE is a maxim in the film industry that you can't make a bad film that involves a train. If it is a thriller it will be exciting and if it is a comedy it will be funny. There is something about trains that catches people's imagination.

There is something about computers, however, that does not. Several films and television plays have been made centering around computers and they have never, it seems to me, rung true.

The function they perform is obscure, while it is obvious what the use of a train is. In carrying people from A to B. The workings of computers are totally hidden inside, making them seem impenetrable and devoid of personality. Unlike temperamental steam engines or even cars. This complete lack of human interest makes them a barren subject for any art.

This is rare and exciting, something when one finds an author who has

succeeded in producing moving and entertaining writing based around computers, and this is what John Race has done with his slim volume of stories and poems entitled, Tales from the computer room.

Race is a lecturer at Brunel University with a broadness of interest and artistic sensitivity sadly rare in the computer world. The pieces in his book range from highly intellectual wit to satire, to pathos, and all equally ingenious and effective. There is science fiction, crime, the occult, burlesques of Cheaterston and of Saki, a Petrarchian sonnet.

There is a story of an infuriating robot that keeps pointing out the logical inconsistencies in the way its owners run their lives, and which seizes up every time a remark of theirs contradicts an earlier one, suffering from an 'axiom hang-up'.

One particularly poignant piece is a monologue bewailing isolation in an horrific everlasting limbo, that turns out to be by a memory cell chained to itself. Many of the key points in the stories are computer jokes, but your non-computer friends might well find the book intriguing,

and certainly different. There is some nicely-turned, subtle observation slipped in, such as in a description of some new programmers: "rather odd-looking characters without beards".

One sample cannot do justice to the book, but I think you should have some sort of taste of it: FEMININE INTUITION. Men, think we are not blessed with souls. Are useful, yes, for drudgery and helping them attain their goals.

(Ours to them, a boring mystery).

We can read, this they accept. Can work out sums, and write a bit: Stere - stuff, remember where it's kept. And, fetch it, when a man wants it.

We're tired of condescension, tired of being Adam's latest rib (Woman, the first, rather misfired). We've had enough. Computer Lib!

RORY JOHNSTON

A primer on disciplined programming using PL/I, PL/CS and PL/CT, by Richard Conway. 419 pp. Winthrop Publishers Inc, 7 Dunster Street, Cambridge, Massachusetts, USA, 02138.

PL/I has been likened to a Swiss Army knife with 100 blades. — there is unquestionably a blade for whatever you might want to do, but there is some risk that in using one blade you will cut yourself with another.

This book introduces disciplined, well-structured

programming based on the use of three compilers designed to save you from the death of 1,000 computer habits that will be continued when the program graduates to PL/I.

In PL/CS there is a shift of emphasis to the prevention of logical errors rather than the 'repair' of syntactical errors as in PL/I.

PL/CT is an 'interactive' version of PL/CS. An interactive version of PL/CS is also planned.

All three compilers have been developed by the department of computer science at Cornell University. The first Cornell compiler in 1961 provided facilities which were improved in PL/CS.

To quote page 87: "The proper attitude is to be appreciative when the correction is helpful; amused when it is not." The programmer may be less amused when the incorrect 'repair' causes new syntax errors to be generated from that statement as described on page 88.

Surely it would be better

for Cornell to be informed of all 'abortive' 'repairs' so that compiler faults are corrected instead?

I found the similarities between the Cornell compilers confusing especially when differences with PL/I were also mentioned at the same time.

Obviously, the book's appeal is mainly directed to those with access to a Cornell compiler but it may also be of general interest to PL/I enthusiasts and compiler writers.

Brochure

THE names and addresses of most suppliers of microfilm equipment in the UK and descriptions of their products are included in a booklet now available from the Business Equipment Trade Association.

The first 20 pages of the booklet are devoted to explaining what microfilm is, various types of microfilm format, photographic processes, indexing and retrieval methods, staff training and the legal aspects of microfilm. There is also a section which presents the potential user with a checklist of points to be considered before implementing a microfilm system.

An introduction to microfilm, 100pp, £4. Business Equipment Trade Association, 108 Kingsway, London WC2.

Dr. Adrian Stokes of Langton Information Systems describes "The design of future telecommunications". There is a supplement by R. Feldman of the Post Office listing in some detail the PO's present facilities and future plans.

Nigel Laurie of Communications Audit makes the point that the right man-machine relationship improves user performance. The spelling, punctuation and general editing of the book unfortunately leave something to be desired.

Spreading
the message

Data communications: spreading the message, edited by Alan Simpson. 120pp, £9.95. Input Two-Nine Ltd, 7 Banstead Road, Purley, CR2 3ER.

COMMUNICATIONS is the subject of the latest book in the series "Current aspects of computer technology" published by Input Two-Nine. Entitled "Data communications: spreading the message", the book contains articles by a range of well-known names in the industry giving their views of current and further communications technology.

In the State of the Art section, John McNulty of

Modular Technology gives a characteristically punchy critique of the Post-Office Monopoly.

Dr. Adrian Stokes of Langton Information Systems describes "The design of future telecommunications". There is a supplement by R. Feldman of the Post Office listing in some detail the PO's present facilities and future plans.

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In this advert we have given brief details of a very few of our current requirements, if you are not completely satisfied with the deal you are getting then call us, we will determine your capabilities and suggest a wide range of job vacancies.

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